



ICI MAGAZINE

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Peter Allen Frank Jenkins Gordon Long John Sisson Susan Wilsher John Woolley

CONTRIBUTORS

Peter Allen has been a Director of ICI since 1951 and a Deputy Chairman since 1963. He was also from 1959 to 1962 President of ICI's Canadian subsidiary, Canadian Industries Ltd. He is currently a member of the British National Export Council and of the Commonwealth Export Council and is Chairman of the Committee for Exports to Canada. He has many interests outside work, of which the chief are golf, travel and railways.

Michael Clapham is the ICI Director in charge of co-ordinating the Company's overseas policy and he also has particular responsibility for Australia, India and Pakistan, the Far East and Middle East, and Arab North Africa. A printer by profession, he joined The Kynoch Press in 1938 and became its manager in 1940. He was appointed to the then Metals Division Board in 1945 when only 33, becoming a Joint Managing Director of the Division in 1952 and Chairman in 1960. He was appointed to the ICI Board in 1961. His outside interests include printing, cooking and, as the owner of a narrowboat, canal navigation.

Frank Jenkins is Overseas Commercial Manager of Paints Division. He joined Nobel Chemical Finishes Ltd. in 1936 and its export department the following year. A TA soldier, he served in the Royal Artillery for six years before going back to exporting. Later a home sales manager for some years, he was glad to return to overseas activities, first as export sales manager and, since late 1963, in his present job. Still enjoys travelling, but at home is happy in the garden or doing odd jobs about the house.

Gordon Long is Head of the new ICI Public Relations Department which came into being on 1st January. Trained first in advertising before becoming a journalist, he joined Central Publicity Department just before the last war and for the past 10 years has been an Assistant Publicity Controller. Over the years he has contributed many articles, serious and humorous, to the *Magazine*, one of which was also broadcast by the BBC.

John Sisson is the ICI Liaison Director for Nobel Division and Territorial Director for Latin America. He joined ICI in 1933 from Bristol University, and his first job was in plastics research. Much of his subsequent career was with the Plastics Division, of which he became Sales Director in 1949, Joint Managing Director in 1951, and Chairman in 1963. He joined the ICI Board in March last year. He is keenly interested in mountain walking, foreign travel and modern art.

Susan Wilsher is a shorthand/typist in the Organic Chemicals Department at ICI's Sales Office in London, which she joined direct from school in 1961 as a trainee. Besides her interest in tiddlywinks, about which she writes on page 26, she enjoys dressmaking, netball, squash and dramatics. As a member of the ICI Players she has taken leading roles in recent productions of *Billy Liar* and *Hay Fever*.

John Woolley joined Dyestuffs Division's Research Department from Birmingham University in 1940 and since 1950 has been working on organic chemical problems in colour photography. He carries his work into his hobbies, which cover many aspects of practical photography from close-up natural history to exploring and photographing the fascinating underworld of caves and potholes and lecturing on both these subjects. On invitation as still photographer, he joined the 1964 British Expedition to the world's deepest cave, the Gouffre Berger in France.

FRONT COVER: China's National Day celebrations. Fireworks in the People's Square, Peking. Photograph by Jim Thurlby, ICI Press Officer.

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Not by any means a dog's life

By the time the next issue of this magazine appears in print the present editor will have passed into retirement. Custom allows him on such an occasion to take farewell of readers and the outgoing editor is not one to hold custom cheap. Being an editor is at one and the same time an exhilarating and a chastening experience: he finds himself simultaneously in the seat of judgment, as it were, and in the pillory. If things go well the credit belongs, rightly, to contributors and printers. If things go badly, it is the editor who is to blame. This is not to say that the occasional and perhaps inevitable lapses which find their way into any journal have not been treated, so far as the

present editorship has been concerned, with liberality and understanding.

It is, however, curious, as any editor will confirm, that the surest way of hearing from readers is to be guilty of a false statement of fact or a misquotation. Now there are few editors who do not welcome communications from readers, fewer still who can resist a sense of self-gratification when they hear that a particular issue or feature has been appreciated. They seldom, however, do. For one reader who takes up his pen to find matter for commendation there will be a dozen who do so only to point out an error. This may well be as it should be. For one contribution that is gratefully accepted there will be, alas, many which for one reason or another have to be rejected. It is only natural that those who have taken the trouble to send something in should be disappointed at having it sent back. If on top of that the next issue contains something which happens to be incorrect—such as calling a picture of a man gathering apricots (August–September) one of a man gathering peaches . . . ! But no, the letters which the editor receives on such occasions, the letters which make his face long and his temper short, are seldom if ever from disappointed contributors!

May this editor, therefore, as his responsibilities devolve, say with sincerity that the least pleasant part of what has been a very pleasant job indeed has not been the detection of his lapses but the disappointments that he has had sometimes to inflict on those who have sought to make his task lighter by supplying him with contributions, which he has had regretfully to return. His regrets on these occasions have been sincere.

Every dog has his day, it is said. This dog has had many. He goes to his back-yard, to lie in the sun, as he hopes, and to scratch himself, with feelings of gratitude and affection towards his many masters. They have been good to him.

H.M. 3



The Editor when young

"OUT OF CHINA"

by Peter Allen



China old - approach to the Ming Tombs



China new - Peking bus stop: Tien An Men Square

TO the strains of a military march—with which we had become all too familiar in the past few days—the Moscow express chuffed out of Peking station to start its 4914-mile journey which would occupy 129 hours—out from the fascinating city of Peking with its great city gates and its temples, palaces and courts, the royal blue tiles of the Temple of Heaven and the golden yellow roofs of the Forbidden City. During our stay in China we had been fully occupied at the ICI Tientsin Exhibition, in sight-seeing and at numerous functions and banquets. One of the most notable of the last was a dinner given on the eve of the great National Day parade on 1st October in the vast People's Hall which had been constructed in ten months, when 6500 sat down at table, all in one huge room without supporting columns or pillars. Then there was the parade itself next day, brilliant with flags, floats, banners, balloons, bands and paper flowers; on this occasion half a million people filled the huge square in front of the reviewing stand and a million were in the march

past, a solid river of humanity. There was also a tremendous firework show that night, and next day a display of mass calisthenics in the stadium, where a backdrop of 12,500 people in the stand made pictures and patterns with the aid of coloured cards changing rapidly at a given signal.

The famous buildings were superb, and not the least the Ming tombs where thirteen emperors are buried, each with a collection of gold and enamel objects of wonderful beauty and grace, guarded by an avenue of marble figures and beasts and protected by great gates.

So to the train. My wife and I were aboard and rode for 1650 miles as far as Irkutsk in Eastern Siberia, crossing the hills and uplands of North China, Inner and Outer Mongolia, the Gobi Desert, and finally the rocky shores of the huge and mysterious Lake Baikal. We were on the train for 59 hours—three nights and two days—and can honestly say that we enjoyed every moment of it. Originally we had intended to get off at Ulan Bator,

the capital of the Mongolian People's Republic, spend 48 hours there, and then fly to Siberia and on to Moscow, but after the most tedious negotiations we were refused a visa to stay, on the grounds that the hotels were full and that there was no other accommodation, so we had the mortification of passing through the town with only a brief stop and being unable to visit what looked like a pleasant, if outlandish, place—a mixture of new architecture and nomads' round canvas huts, of modern dress and the clothes of Genghis Khan.

The train itself was of no little interest, modern steel coaches built in China, of uniform style, green-painted with red and stainless steel, trim, clean and comfortable. Each pair of sleeping compartments shared a washroom, but we had one to ourselves, as the train was very empty. Each country provided its own dining car; the Chinese, who served excellent local food with a cheerful male crew, ran as far as Erhlien; the Mongolians served a depressing sort of hash and didn't offer breakfast, but waited on us

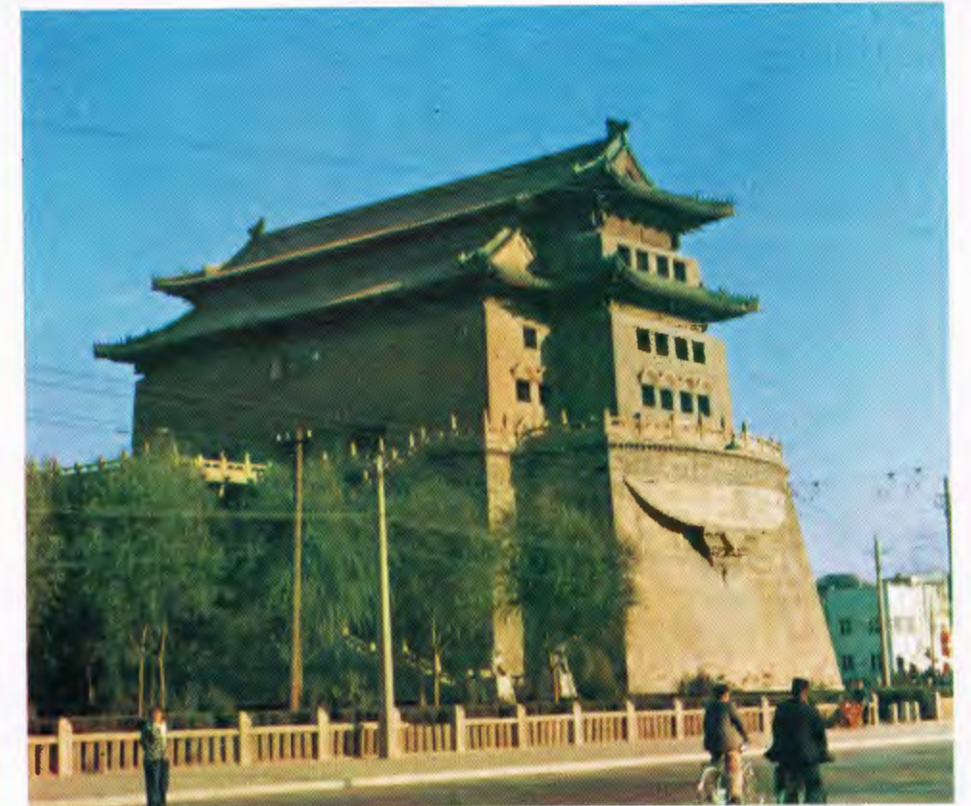


The Moscow express travelling through the Gobi Desert

with a mother-daughter crew sporting a little lipstick, which was something we hadn't seen anywhere in China since we had left Hong Kong. The Russians, whose car came on at Naushki, were, needless to say, the most formal, with waitresses serving us dressed in caps and aprons of a bygone age; they also served very poor food.

On a more technical level one could note that throughout China we were propelled by coal-fired steam engines, while in Mongolia we had a twin-diesel locomotive unit which ran across the country from frontier to frontier. In Russia we started off with a most splendid machine, a glistening green and red semi-streamlined express passenger steam engine which, oddly enough, burned wood—or a mixture of wood and coal—which sent a shower of sparks out into the cold night air; then at Ulan-Ude, where we joined the Trans-Siberian Railway, we acquired the first of a series of electric engines which were to haul the train on its 3532-mile run to Moscow.

Then there was the most interesting



One of the Peking city gates, the Ch'ien Men



The Great Wall

technical operation of changing the bogies carrying the coaches at Tsining, where the gauge of the track changed from the 4 ft. 8½ in. of the Chinese National Railways to the 5 ft. of the Russian system. The reason for the change of gauge is, of course, the non-standard Russian gauge, but the fact of its occurrence in the interior of China is one of those quirks of history by which the new Trans-Gobi line was built by the Russians, not only across the Mongolian Republic—which has for years been in their “sphere of influence”—but also across Inner Mongolia as well and so on into China proper. Now that Russia and China have quarrelled, this railway sticks into China, as it were, like a sore thumb, and there are plans to make the break of gauge at the Mongolian frontier.

We left Peking at half-past nine at night and swung round the remains of the city walls, passing on our right one of the great city gates still standing proud above the surrounding walls and houses. We then settled down to the passage of

the plain near the city, which gave way to gentle foothills on the north-west flanks. This period we spent most pleasantly with some friends from the Embassy who were going to Ulan Bator on duty, sampling in the dining car the very fair Peking beer, which had, if my memory is correct, the unpromising name of “Five Goats.” Then as we dispersed towards our rooms we drew up at the station of Nankow and suddenly realized that we were about to climb the pass which leads up through the rough hills to the mountain saddle where the Great Wall of China lies. We had been out to the Great Wall from Peking the weekend before and it had been a sad disappointment; not that it wasn’t a superb and spectacular edifice, but because it was on that day so swarming with people that it was like Blackpool sands on August Bank Holiday. Here was a famous spot where one wanted to muse and meditate on the great and bloody history which had passed by this place; here one wanted to gaze, and gape even, at the fantastic and spectacular construction which 2,500 years ago took this wall

for 3,500 miles across violent and precipitous hills without pause and without flinching. But being jostled and hustled over these fearsome steps and slopes by even the most good-natured and well-mannered crowd was a sore trial.

Now we were about to climb the pass again and go under the Wall at midnight—and on a midnight glowing with the full light of the Hunter’s Moon. My wife and I resolved to stay up. Our train was now steam-hauled fore and aft: in front we had a big black mixed traffic engine, headlamp gleaming and chime whistle roaring as we crossed and recrossed the old Imperial North Road, which shares the valley, or entered one of the many tunnels; behind we had a banking engine working equally hard, exhaust blasting up high into the night air with its whistle crowing in response to that of the train engine at the head end. So we assaulted the twelve-mile climb of the Nankow Pass with its ruling grade of 1 in 30 and an average of 1 in 40.

As we stood in the corridor, shrouding our heads in the curtains to shut out the



Station scene at Ulan Bator

reflections of the inside lights, we watched the attack on the hills with delight. From time to time we would say “Look, there it is!”, but it never was, and as we passed into the summit tunnel we thought we had missed it altogether. Then as we came out on the north side we looked back and there was the Wall, pale on the dark hills like a great snake, striding up and over this wild dark landscape in the moonlight for miles, unmistakable and unforgettable, a moment of a lifetime.

When we came to on the first morning out of Peking we were in dry buff rolling country, like the great plain of Castile in Spain, which persisted all the way from the Great Wall to Tsining and beyond. Then as we chugged slowly north, behind a wheezy freight engine during that day, we gradually climbed and slowly ran out of arable into pasture land, dry and spare, golden in the autumn light, with here and there mounted men on Mongolian ponies booted and clad in long padded coats, guarding large herds of cattle, horses and dromedaries. This was Inner Mongolia and, as the day wore on, the rolling hills

flattened out and became drier until when we came to the frontier at nightfall we were in sandy, scrubby country—the edge of the Gobi Desert. Here at the frontier the architecture and the dress and style of the staff changed abruptly from Chinese to Russian, with the soldiery and frontier guards in top boots, Russian blouses and caps and shoulder straps.

Next morning, well into Outer Mongolia, we woke to a brilliant frosty sunrise over rolling grassy hills running far to the north and east. Behind our twin diesels we weaved and wound round sweeping curves down to the long narrow valley between brown hills where Ulan Bator lies. At each road or path crossing the railway a man stood guard on a pony holding in his hand a little yellow baton.

Forty minutes at Ulan Bator was, as I have said, rather a frustrating experience, but the crowds on the platform in their varied dress who had come to see the train go by were most interesting, many in Mongol top boots and double-breasted coats fastening at the side, fur hats and

brilliant coloured silks, alongside western dress and Russian men’s styles.

Then we were on our way again, this time through hills, with watercourses in their folds, and trees on the tops now white with frost before the sun had gained strength. So up to the more wooded hills of the Russian frontier, passing even a small industrial district before reaching Naushki at dusk.

Our struggle to communicate with the Mongolian customs officer, who at first could only find a form in his own language and in Russian, had occupied a pleasant hour in the afternoon before an English translation was found. At the first Russian station a Bank was very welcome, since we had just spent 24 hours entirely without local money after the compulsory exchange of our residue of Chinese money into pound notes, in which the Mongolians had no interest whatever. Armed with some roubles we could enjoy a tot of vodka and some wine with our dinner and retire to bed in good heart. This was as well, for when we awoke next morning near Irkutsk it was snowing hard.



PAINTS AROUND THE

ICI's investment in paint is now greater overseas than in the UK, and much more paint is made and sold by our associates abroad than by Paints Division in this country. Paints are made by ICI and associated companies, including companies manufacturing under licence, in twenty-three countries overseas; nineteen companies are involved, and between them they operate thirty-five factories. These figures will very soon be out of date.

Paint is a complex sort of product in that the stuff you put on your house is quite a different kind of thing from the finish that beautifies and protects your motor car or the coating on the outside of your toothpaste tube (because that is a paint, too), but there are additional quirks about the business when you look at it on a world-wide front. They like their decorative paint to have a different consistency in Germany; they like it to have a lower gloss in Sweden; in the tropics it must be fungus resistant. And if you are a car refinisher in Switzerland the odds are that you would use a different type of finish from that generally used in this country. There are many such variations. Colour preferences vary too, and it is not surprising that strong colours are more popular in the tropics, where everything seems more colourful, than in the chillier, more austere northern climes—but colour is to some extent a matter of fashion, and paint manufacturers have to keep up with it wherever they are.

We try in Paints Division to keep an eye on every country in the world where there is a worthwhile market for paints. If in any country the prospects for exports from the UK are poor because of local manufacture, high import duties or other restrictions on imports, we consider all the relevant factors in order to determine whether we should establish local manufacture, either on our own or perhaps in collaboration with local interests or by acquiring an existing firm with the object of building on the foundation



Hamburg: Spangenberg-Werke—*Frei. LA. HCg 229-163*



Toronto: CIL's York Works. This plant manufactures products sold to the automotive, refinish and general industrial markets

WORLD *by Frank Jenkins*

already established. Sometimes the best course open to us is an arrangement with a local manufacturer by which ICI can earn royalties or service fees in payment for its know-how and, perhaps, the use of its brand names. The paint is not always sold under brand names that are familiar in the UK. It's 'Dulux' in Australia and India and South Africa but 'Cilux' in Canada, 'Dulox' in France and 'Pentalux' in Trinidad—and that's not all.

In addition to the sale of know-how covering a broad area, opportunities occur from time to time to exploit a major invention, usually as a "package deal." In paint this is hardly likely to be in the polythene class, or at any rate not very often, but Paints Division's 'Dispersymer' technology has opened up an entirely new field and is likely to have widespread repercussions throughout and beyond the paint industry. An invention of this kind still has the same effect as that proverbial better mousetrap—prospective licensees beat a track to your door to acquire the right to use it. The 'Dispersymer' know-how has been sold to leading companies right round the world, and the income derived from it is not by any means trivial.

Most of the associated companies are quite or nearly autonomous, but liaison between them and the Division on both technical and commercial matters is very close. There is a frequent interchange of visits and even, on a temporary basis, of staff, and in the research field there is a planned use of resources to prevent overlapping; conferences take place from time to time, sometimes in England and sometimes overseas. In recent years, too, there have been "summit" meetings, meetings of the top men in Canadian Industries Ltd., Paints Division; Dulux Ltd., South Africa; BALM Paints Ltd., Australia; and ICI Paints Division. The most recent of these took place last March in Australia.

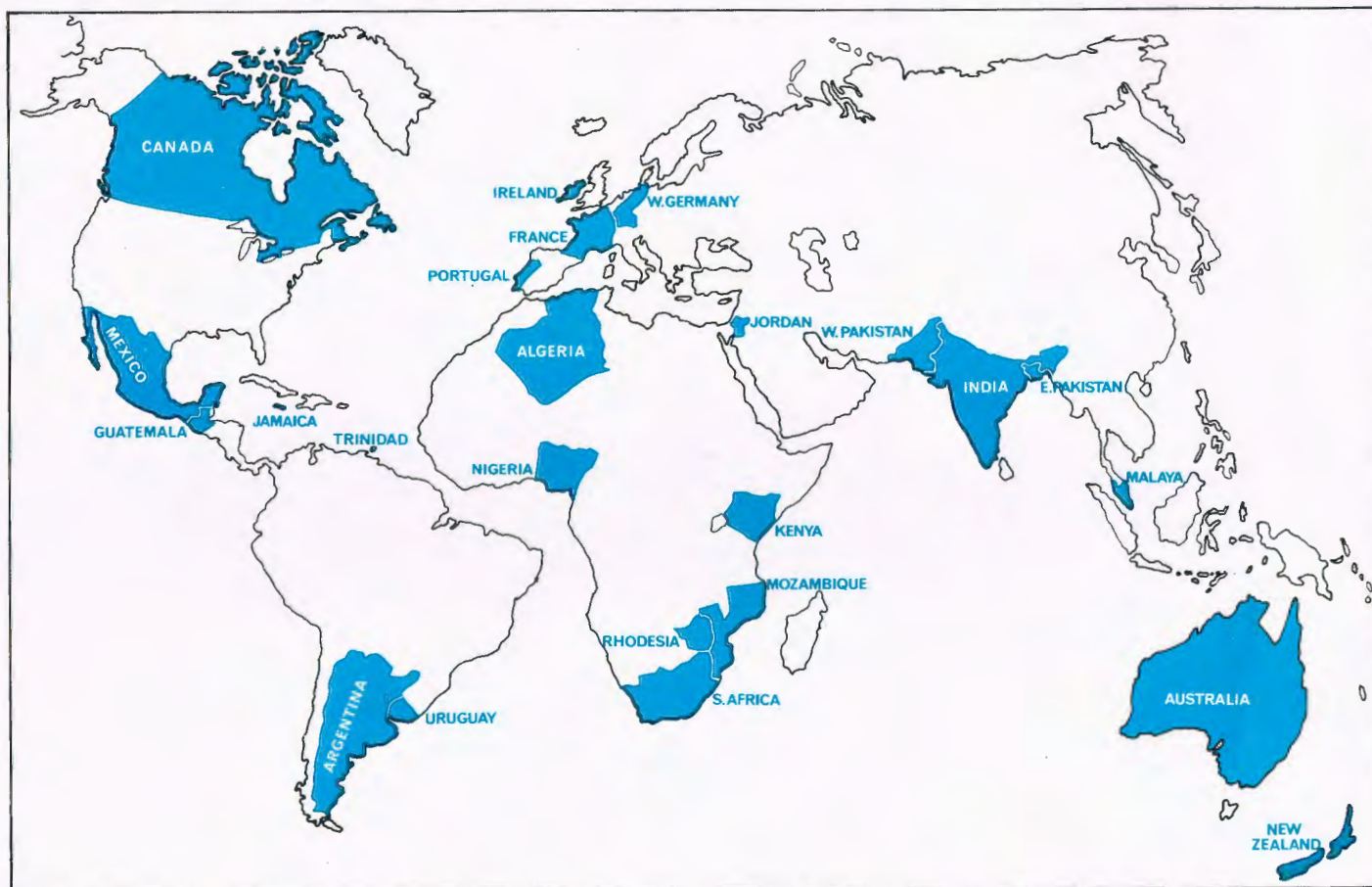
CIL is the largest paint manufacturer in Canada, with five plants from coast to coast. It was the first member of the ICI



Australia: The BALM Paints Research Laboratory at Clayton, Victoria



Johannesburg: An express delivery scooter being loaded in a Dulux Ltd. warehouse with urgent deliveries



World map showing countries (printed in blue) in which paints are manufactured by ICI or Associated Companies



Mexico: Matching department in one of our retail stores. They match colours for decorative paints as well as automotive refinishing

family outside the UK to extend its paint manufacturing interest beyond its own country. This was in 1961 in Jamaica, where a flourishing export business had been built up but might have been lost to locally established competitors if CIL had not gone in themselves. CIL also shares with ICI in the operation of Pinturas ICI de Mexico, which has the most modern paint factory there.

Dulux Ltd. in South Africa is a wholly owned subsidiary of African Explosives and Chemical Industries, itself a fifty-fifty partnership between ICI and De Beers Industrial Corporation. Dulux Ltd. was set up (as AE & CI (Paints)) shortly after the war.

Production of paints was established at Rishra, fifteen miles up the Hooghly River from Calcutta, by the Alkali and Chemical Corporation of India Ltd. in 1952. There have been several plant extensions since, and the sales figures are constantly setting up new records.

In West Germany most decorative painting is done by craftsmen. Most of the paint they buy is white, and Spangenberg-Werke, which ICI acquired in 1962, supplies more of it than anybody else.

(When a colour is required, the craftsmen add the appropriate tinters to the white paint.) A good start has been made by Spangenberg on tackling the developing "do it yourself" market in Germany.

The affiliated company in France in which ICI has a minority holding is Société Française Duco, which also has a factory in Algeria. SFD is among the leaders in the industrial and transport paints markets but has not devoted as much effort to the decorative paints market as we have in this country—maybe this explains why so many buildings in France appear to need a coat of good paint! SFD is now going into the decorative business in a bigger way, so perhaps we shall see a difference in due course.

The first batches of 'Dulux' left the factory of ICI Paints (Malaya) at Petaling Jaya in April 1959. There were considerable extensions there in late 1961, and more are now being planned.

ICI Paints (Nigeria) was set up in September 1962 and is now getting into its stride, with production running at a rate well ahead of the theoretical capacity of the plant. So this company, too, is planning increased production capacity.

Coming nearer home again, the friendly relationship between Harringtons and Goodlass Wall Ltd. and ICI in the Republic of Ireland enabled a joint selling company, Irish Industrial Finishes Ltd., to be formed many years ago, and this has recently been cemented by ICI taking a share interest in HGW. We are told that the main negotiations that led up to the arrangement took place, not in stuffy boardrooms, but walking around the coast of Kerry and on a remote island off the Galway coast called Inishbofin. Delightfully Irish! 'Dulux' is now manufactured in Cork, and the best-selling colour is—green! Industrial finishes made to Paints Division specifications are also widely used in the many new factories that have been set up in Ireland.

The biggest of our paint-making associates is BALM Paints Ltd. in Australia, together with its offshoot BALM Paints (NZ). Those initial letters originally stood for British Australian Lead Manufacturers Pty. Ltd., a company set up in 1918 through the initiative of the White Lead Convention in the UK and directly resulting from the first World War and its effect on the availability of white lead in Australasia. From the outset the manufacture of paints alongside white lead and



Visiting the Clayton, Victoria, factory of BALM Paints Ltd. while assembled in Australia for a top level meeting (from left): Mr. E. P. Sanford, Managing Director, BALM Paints, Mr. R. C. Williamson, General Manager, C.I.L., Paints Division, Mr. T. H. Howard, Managing Director, Dulux Ltd., South Africa, and (second from right) Mr. J. D. Rose, then Chairman, ICI Paints Division. With them are Mr. J. N. Graves, Director, and Mr. D. G. Paech, General Manager, Victoria Region

other allied products was a part of the BALM programme, and in that same year, 1918, the Australasian United Paint Co. Ltd., Adelaide, was acquired as a going concern. This company had originally been founded in South Australia in 1848. By 1920 there was talk of setting up a paints factory in Sydney, and manufacture started at Cabarita in 1925. During 1927 talks were going on between BALM and ICI on co-operation in the paint industry in Australia, and by the end of the year the terms under which ICI acquired a substantial interest in BALM were agreed. This was increased to a controlling interest, held by ICIANZ, in 1947. BALM (NZ) Ltd. began manufacture in 1939, and there are now two factories in New Zealand and five in Australia. With a total of nearly 2,500 employed, BALM has a production capacity of nearly 10 million gallons a year, about one-third of the present Australasian market.

Other countries in which ICI paints are made either by associated companies or under licence include Trinidad, Argentina, Uruguay, Portugal, Kenya, Jordan and Pakistan. Twenty-three countries in all—it's a long list.

Having in mind the arguments that have gone on about the wisdom of cutting down British investment overseas it is worth recording that, almost without exception, when we establish a new manufacturing offshoot overseas we supply substantial quantities of intermediates, partially processed materials for further processing and incorporation in finished

products, and this is likely to go on for some years. Indeed, intermediates are now a significant and growing part of our total exports. Apart from this, the bulk of the plant and equipment of these factories comes from this country.

In the long run exporters of paints are on a difficult wicket. The paints "empire" has grown to the point where we are encountering a fresh problem in that many of the overseas companies are looking for export markets of their own. The pressure of the balance of payments problem is much heavier in some countries than it is in others, but where the need to export is of paramount importance, as it is in India, for example, Governments will look to the paint industry to export some of its production, and, indeed, the availability of import licences for raw materials which have to be brought in from abroad may depend on performance in the export field. Obviously we have to safeguard our brand names—you cannot have competing products with the same brand name without endangering the registration—but apart from this we do all we can to help our associated companies to find export markets. We don't mind them competing with us (or with one another!), subject to what has just been said about safeguarding brand names. At the same time it must be appreciated that competition in the paint field is exceptionally keen throughout the world, with very many countries and companies participating in it and with more and more countries becoming nearly, if not quite, self-sufficient.

THE CHIEF EXECUTIVES

Douglas Bell of ICI (Europa) Ltd.

If Douglas Bell is not dubbed the Flying Dutchman it will be a miracle, for as the Chief Executive of ICI (Europa) Ltd., and the former head of the European Council, his journeys by air to and across Europe have for long numbered at least one every week, and he thinks as little of driving himself in the early morning to London Airport, flying to Holland or, for that matter, Milan, Frankfurt, Brussels or Copenhagen, spending the working day in his office there and flying back home again in the evening, as other people would do of coming up from a Division to spend a day in Millbank.

But of the Europe of which in one sense he sees so much in another he sees very little, his visits being confined to offices, the odd restaurant for lunch or dinner, his hotel bedroom, and of sightseeing nothing at all.

All of this becomes, however, highly understandable when one talks to him of his job and of the kind of role which the new company, ICI (Europa), is expected to have to fill.

To understand this it is necessary to go back a few years. The advent of the European Economic Community, or the Common Market as it came to be called, confronted manufacturers in Britain with some critical problems. ICI's interests in Europe had become, since the war, many and complex. For the most part the Divisions themselves handled their European affairs through agents and associated companies. Contacts, naturally, varied in closeness and extent. There was, for ICI as a whole, nothing that could be regarded as a coherent pattern of operations or even of selling. Then came the EEC, with its immediate implementation of preferential tariff agreements and prospects of ever more significant commercial and political integrations. Accordingly

the Board of ICI set up a committee thoroughly to examine the implications of the situation and to make broad recommendations as to what should—as far as could then be estimated—be ICI's policy. The committee lost no time, and its report was issued to the Board in July 1960. The main recommendations—to the effect that ICI must be prepared to undertake manufacturing operations on the Continent, whether or not the full commitments in the concept of the EEC were ratified by the member countries—were accepted by the Board. As a result, a working party, to be known as the European Council, with the status of a Division Board, was set up to review the conclusions of the committee's report and to prepare positive and detailed recommendations as to how the main conclusions should be implemented and developed. Douglas Bell was appointed chairman of the Council.

There at once began for him a period of intense effort and activity, frequently beset with every kind of frustration and discouragement, from which, five years later, he has emerged apparently quite unscarred and unharassed, and for which, one feels in talking with him, he was peculiarly well fitted.

For Mr. Bell gives a strong impression of being a man who can go into action with the barest minimum of apparatus and logistics to support him. Not for him the need of a large, impressively furnished office or a battery of supporting references. One feels that, given the right man with whom to discuss a project or to thrash out a course of business, he would do so as easily and effectively on a street corner as in a well-furnished suite of chambers. Spare of build and energetic, without being over-emphatic, of speech, with a quick smile and an eye that appears

not to miss the lighter side of a situation, Douglas Bell is an easy man to meet and talk to—provided, one feels, that one is not just wasting away time.

He is and needs to be an organiser. ICI has over sixty subsidiary or associated companies in Europe. Part of the business of ICI (Europa) is to draw these interests together. The Divisions, too, have their own, and often long-established, methods and contacts. In a sense, the task of ICI (Europa) is rather like that of the Common Market itself: some measure of absolute autonomy has to be given up in the interest of the common weal. Mr. Bell's mandate—which is fully in accord with his natural inclinations—has been one of persuasion rather than compulsion. Reason and argument have been his weapons, but one guesses that he would not speedily lay them down. Indeed, a confident robustness of constitution sits easily with his tall, spare frame, and anyone engaging him in argument might guess that his adversary would not easily tire.

A family man, with two girls and a boy at an age when they have a claim on a sufficiency of the paternal presence, Mr. Bell finds that the comparatively "short hauls" of his European journeys enable him to spend quite a few of his evenings at home. When ICI (Europa) moves its headquarters permanently to Holland (The Hague), as it expects to do some time in 1966, and he himself has to make his residence there, domestic arrangements may prove something of a problem.

The reason for transforming the European Council into ICI (Europa) Ltd. lies mainly in the desirability of having a definite centre on the Continent, which will serve as a clear and recognisable headquarters for planning and managing



all ICI's manifold interests and will underline the international character of its operations. ICI (Europa) represents, for all to see, the new pattern of the Company's aspirations in Europe—an international headquarters with national branches in the fourteen individual European countries, each staffed almost entirely with citizens of its own country. For its Chief Executive (which is really somewhat like the equivalent of a Division Chairman) Douglas Bell was the obvious choice.

In the highly diplomatic as well as organisational character of the job he has undertaken, Mr. Bell feels himself to

have been very fortunate in the great number of friends that he has throughout ICI, and in the chance that his previous ICI career led him to work in and with so many Divisions. By origin in the Company a Dyestuffs man, he transferred later to HOC, but has had close association with both Billingham and Fibres and of course had extensive contacts with the personnel of many others during his period in Southern Region. These friendships, and the mutual confidence they occasioned, have been of immense benefit during the formative years of what has been, for the Divisions no less than for the Company, a somewhat revolutionary trans-

formation. But the "ground floors" of what were later to become towering ICI edifices have been no strange territory to Douglas Bell, who was intimately connected with the early stages of pharmaceuticals and fibres and organic chemical sales from all Divisions as well as the development of petrochemicals at Billingham.

Mr. Bell is a graduate of St. Andrews and is proud of it and of the fact that at least four of his contemporaries there—Tom Clark, now Chairman of HOC, Ted Abbot, Managing Director of ICI (Fibres) Ltd., John Kitchin, Plastics Group General Manager, and Tom Howie, Fibres Group General Manager, have all distinguished themselves in the Company's service and are now with him as fellow Board members or senior colleagues in ICI (Europa). But although himself of a Galloway family, with a long and distinguished line of Edinburgh doctors to his ancestry, Mr. Bell was born in Shanghai. Maybe it is this which has made him the cosmopolitan that he undoubtedly is. Coming, also, of a large family, he may have learned earlier than others the virtues of give and take within the family circle.

True to his Dyestuffs traditions, Mr. Bell's pet aversion is pomposity. Like his two prominent Dyestuffs Division colleagues and friends, John Rose and Rowland Wright, Douglas Bell tops his six foot two. Unlike them, however, he does not complain of excessive paperwork, which may appear a trifle surprising.

He is an enthusiastic gardener, with a 1½-acre garden in which he loves to labour. Propagating cuttings is his especial joy, if, as he modestly disclaims, it is not his especial skill. Other hobbies are golf, horse-racing (when he can!) and the collecting of old clocks. He had a long and active, though not particularly distinguished, record as a rugby forward with Manchester and Wasps, and nothing pleased him more than when his son was given his prep school rugby colours the other day. His wife collects antiques, and he is often called on to repair some auction bargain she has found.

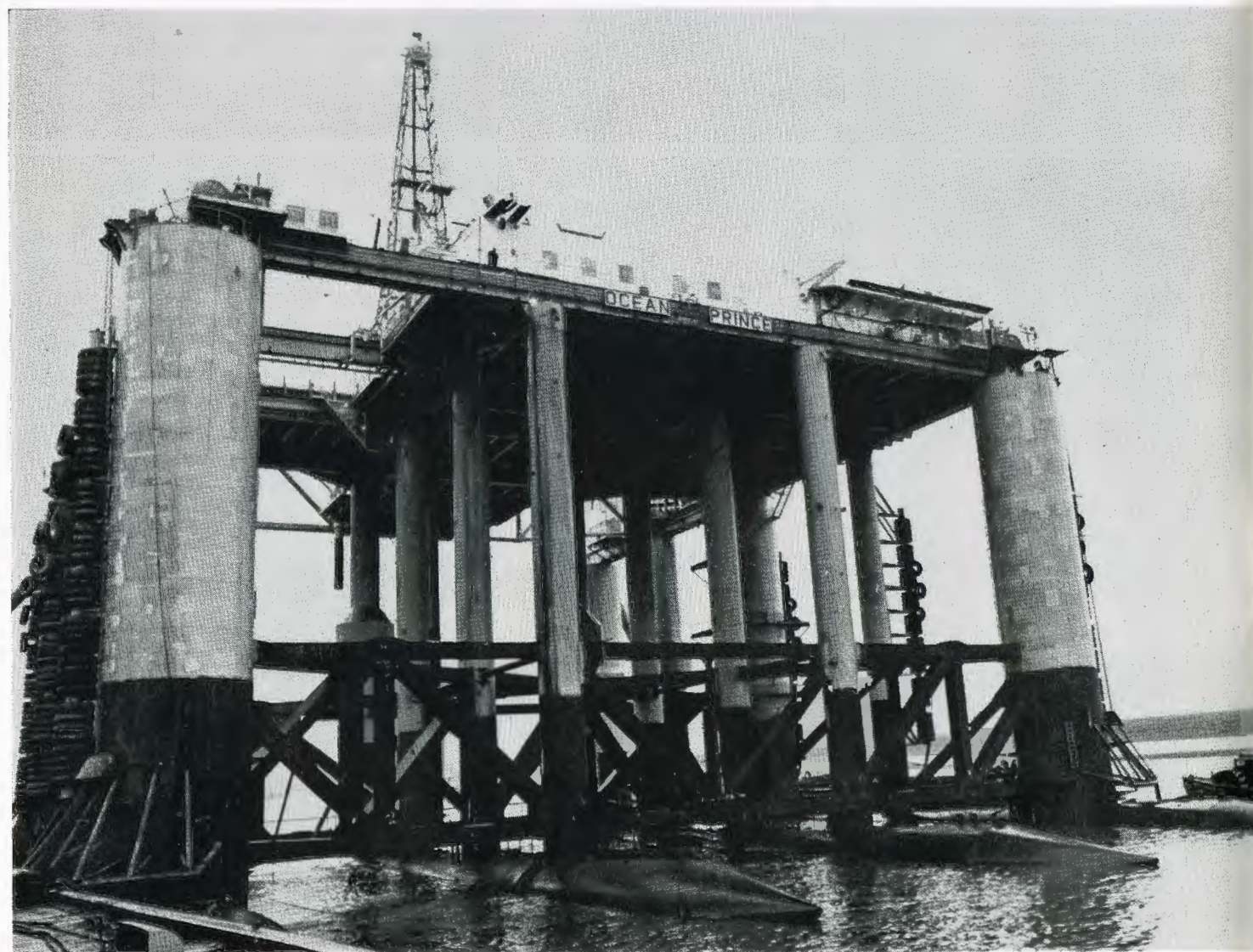
In business he likes best to work with a small, keen and highly competent team.

The future holds enormous possibilities for ICI (Europa) if all goes well. Douglas Bell is determined that these possibilities shall be realised. "There is never a dull moment," he says. One can readily believe him.

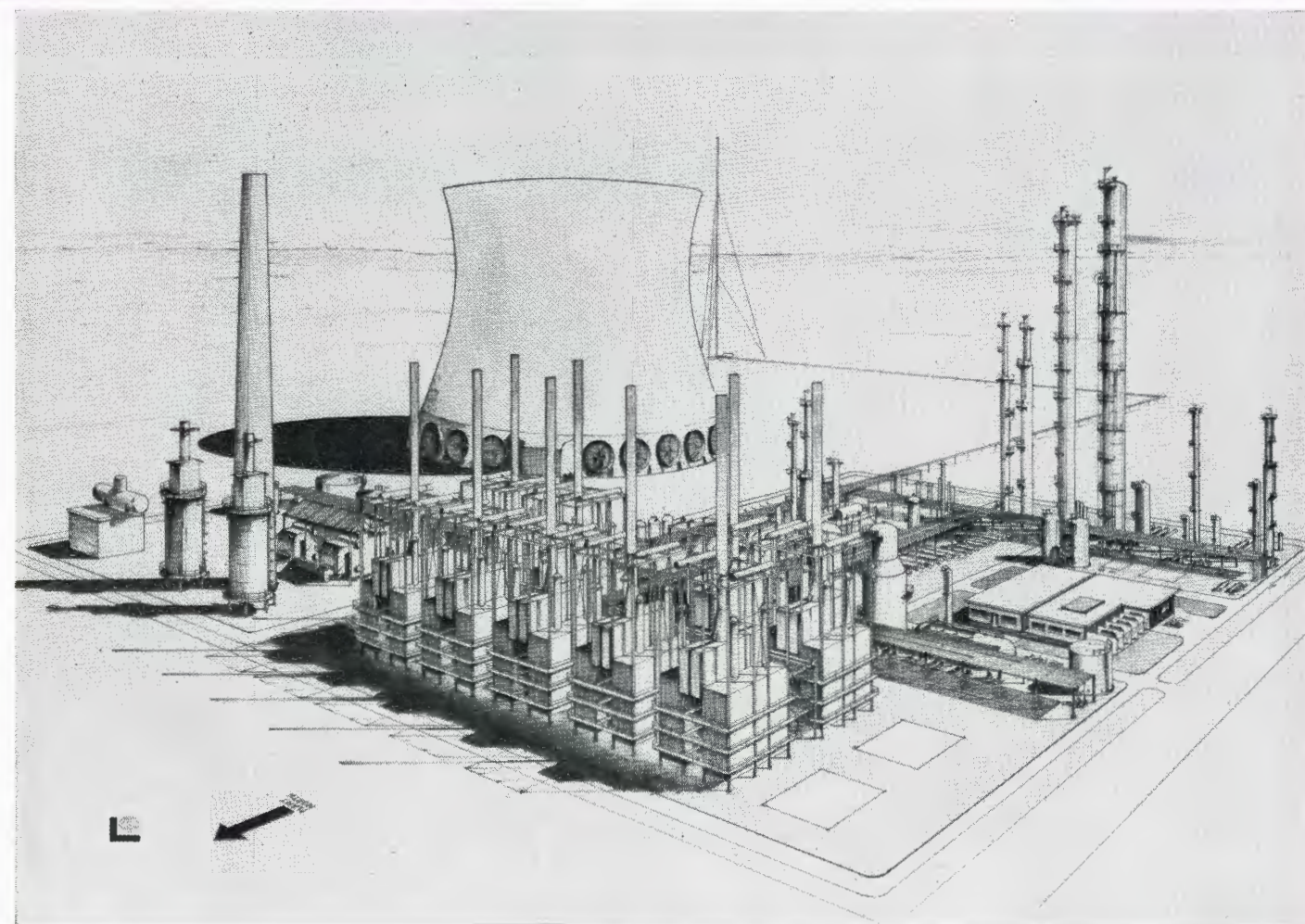
People & Events



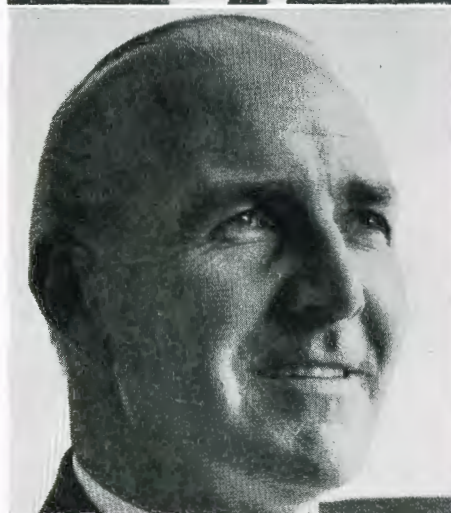
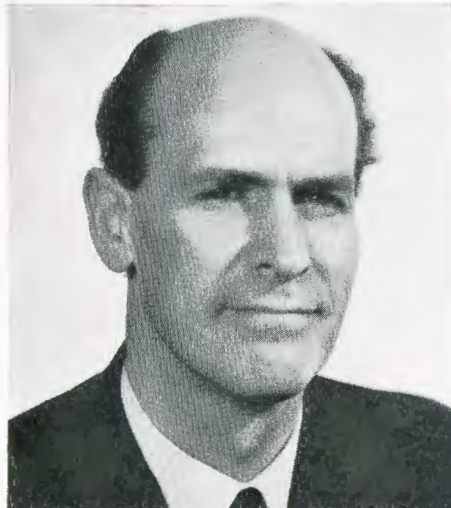
New Year Honours. Two former members of the ICI Board and three present employees of the Company received awards in the New Year Honours List. Mr. Eric Bingen (extreme left), who retired as an ICI deputy chairman in 1963, and Dr. James Taylor (second from the left), director responsible for ICI's metal interests when he retired in 1964, both received knighthoods. Mr. J. H. Collins (third from the left), a chemist in the Technical Department of Mond Division's Product Group A, and Dr. R. Westwater, Technical Service Manager for Explosives Products in Nobel Division, both received the OBE. Miss Doris Evans, a detonator tester at Cooke's Explosives Ltd. (part of the Nobel Division), was awarded the BEM



"Ocean Prince" at sea. "Ocean Prince," seen here in the fitting-out basin, the oil and gas drilling rig owned by Odeco (UK) Ltd., is now in her first drilling position 28 miles off Flamborough Head on the Yorkshire coast, and at the time of going to press it was expected that the first well would be "spudded" by the end of January. Odeco (UK) Ltd. is owned jointly by the Ocean Drilling and Exploration Co. of the USA, which has a half-interest, and ICI and the Burmah Oil Co., each having a 25% interest



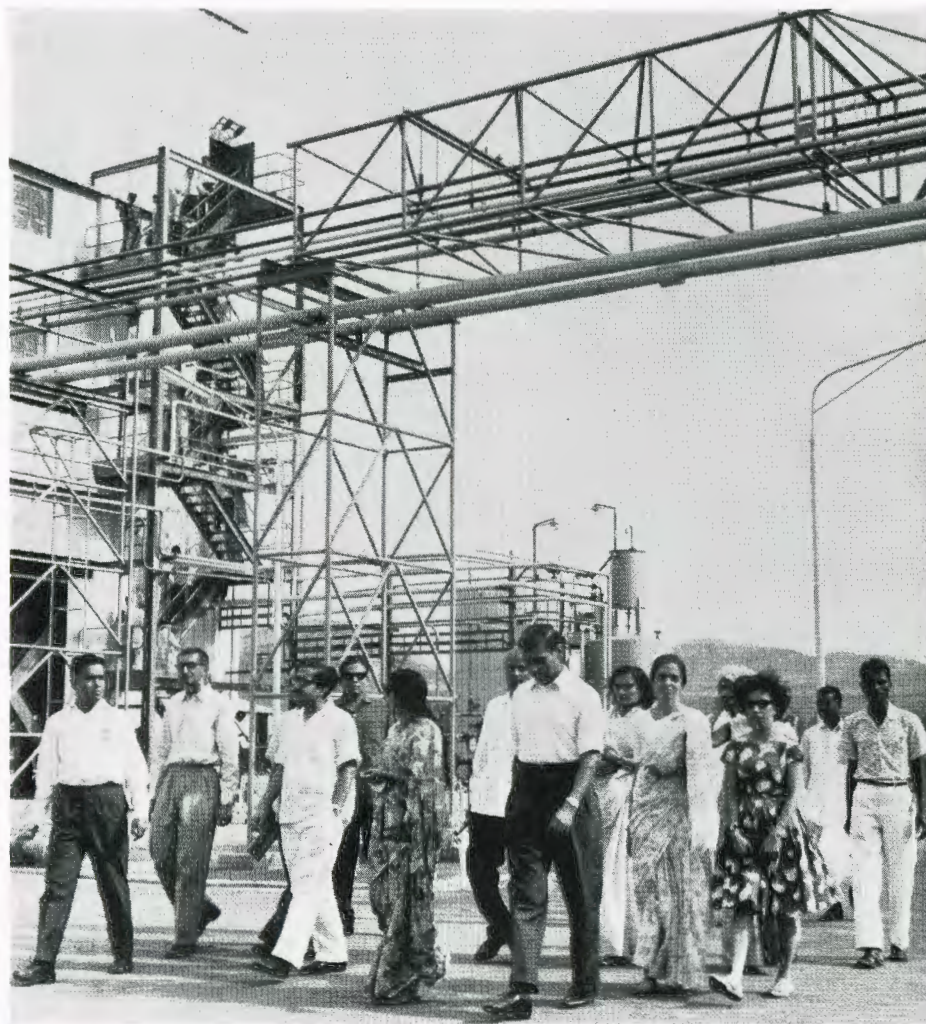
World's biggest ethylene plant. A drawing of Heavy Organic Chemicals Division's fifth ethylene plant. Due to come on stream in the second half of 1967, this will be the world's biggest single ethylene unit and will raise ICI's total ethylene capacity to over 750,000 tons a year. Like ICI's other ethylene units, the new plant will be at Wilton, and the contract has been awarded to the Lummus Co. Ltd.



New Division Chairmen. Mr. S. D. Lyon (top), formerly a Deputy Chairman of Agricultural Division, and Mr. P. F. Overbury, formerly a Paints Division Managing Director, have been appointed Chairmen of their respective Divisions in succession to Mr. R. S. Wright and Mr. J. D. Rose, now members of the ICI Board



Scottish foils title. A delighted Tom Russell (Nobel Division) holds the trophy he won recently at Glasgow as Scotland's new junior foils champion. This was his first open fencing championship



Open day for shareholders. The 'Terene' polyester fibre works of Chemicals and Fibres of India Ltd. held an open day for shareholders on 11th December which was attended by over 2000 visitors. The share capital of CAFI is held partly by ICI (60%) and partly by the Indian public (40%). The 'Terene' works at Thana, near Bombay, was inaugurated last March



Diamond wedding. Mr. Benjamin Gough (82) and his wife Mercy (79), pictured here with the Mayor and Mayoress of Oldbury, celebrated their diamond wedding on 15th October with a family party attended by their eight daughters, three sons and seventeen grandchildren. Mr. Gough, who retired in 1946 after 37 years' service, spent the greater part of his working life on the canal boats of Chance and Hunt Ltd., now part of the Mond Division



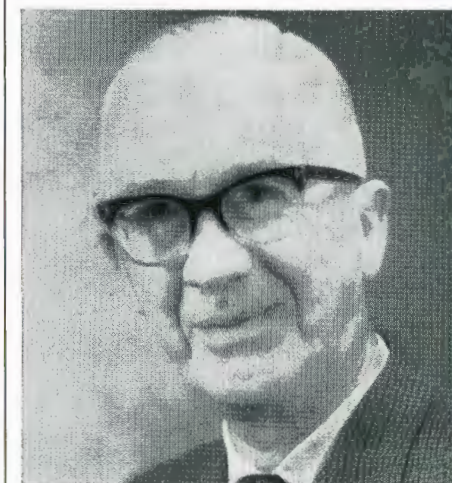
US patent exhibition. ICI (Organics) Inc., ICI's manufacturing subsidiary in the USA, was invited to take part in an industrial exhibition, sponsored by the US Department of Commerce, commemorating the 175th anniversary of the US Patents System. Our photograph, taken on the opening day, includes Dr. Firmin P. Reed (third from the right), Executive Vice-President of ICI (Organics); the Hon. John T. Connor (second from the right), Secretary of Commerce; the Hon. Edward J. Brenner (extreme right), Commissioner of Patents; Mrs. Reed, and representatives of Cushman, Darby and Cushman, the patent attorney firm for ICI in the USA



Honour for Mr. Van der Hoeven. Watched by Mrs. Van der Hoeven, Mr. J. C. Aschoff (left), Burgomaster of Rozenburg, invests Mr. Peter Van der Hoeven with the order of Oranje Nassau, of which he was appointed an officer by Queen Juliana on 12th November. Mr. Van der Hoeven has since retired, after 34 years' service, from ICI (Holland) of which he was the founder and first head



Research appointment. Dr. Percy Small, who leads Plastics Division's Exploratory and Background Research Group, has been appointed an ICI Senior Research Associate. This position, created early last year, is roughly equivalent to that of a research department manager or of a senior professor at a university. Dr. Small's is the sixth such appointment made by ICI from among its outstanding scientists



50 years' service. A half-century's service with the Company was completed on 15th November by Mr. A. Burrows (top), who is on the staff of the Glasgow Office of Settle Limes Ltd., and on 1st January by Mr. W. Fletcher, an employee at Buxton Lime Works



Hospital chooses Bri-Nylon carpet. Bri-Nylon carpet on the floor—more than 350 square yards of it—helps to make the out-patients department of the Royal Free Hospital one of the friendliest in London. This picture was taken after the carpet had been down for seven months, during which time more than 100,000 people had walked across it. It has also survived, without damage, a soaking when part of the out-patients department was flooded during a severe storm



Christmas bonanza. Two awards topping the £500 mark were made in December for ideas submitted under the ICI Suggestion Scheme. Above, left: Mr. John Wheelhouse, a leading hand joiner on the 'Drikold' Plant at Billingham, received a total of £680 for his suggestion, the largest award ever made by Agricultural Division. Above, right: Mr. Fred Halfpenny, seen here with colleagues at Pilkington Sullivan Works, was awarded £550 by Mond Division

EISTEDDFOD AT WILTON

Many Wilton and Billingham employees are among the 300 volunteers who, as members of several sub-committees, are currently shouldering the task of organising the Tees-side International Industrial Eisteddfod which will be held in the grounds of the Wilton Recreation Club from 9th to 17th July this year. A total of £12,000 is available in prize money, and already over 1,200 competitors from 14 countries have entered. They include world-famous choirs, brass bands and folk dancing groups. Entries sponsored by industrial organisations at home are now beginning to come in. Details and entry forms (closing date is 28th March) may be obtained from the General Secretary, Tees-side International Industrial Eisteddfod, 21 Albert Road, Middlesbrough, North Yorks.

Belfast Manager retires. Mr. R. R. F. MacLennan (left), Belfast Area Manager and Chemicals Sales Manager since 1960, retired at the end of December after 36 years' service. He is seen here at a farewell gathering at Belfast Office with Mr. E. D. Carey, Regional Commercial Manager for the North, who presented him with gifts from the Company and from colleagues

RETIREMENTS

Mr. E. T. Grint

Mr. E. T. Grint, ICI General Manager—Personnel, retired on 31st December after 36 years with ICI. Mr. C. M. Wright, ICI Personnel Director, writes:

Ted Grint retired at the end of December after 36 years' service in the Company, and he is just about the youngest-looking 62-year-old that I know. His career in the Company has fallen clearly into two parts. In his first 19 years he had experience in both personnel and commercial aspects of Nobel Division's business; he was highly regarded in the Division and reached Division Director status at the age of 42. In 1948 he came to Head Office, where he spent over 17 years on the personnel side; for the last 14 years he was the Personnel Director's chief adviser on all aspects relating to our payroll and was responsible for seeing that the Board's policy was implemented. In the last three years he had the added responsibility of advising on staff policy.

His warm personality, his sense of humour, his unruffled temperament, and his ability to think clearly—qualities each one of us would like to possess—enabled him very readily to win the respect of employees at all levels in the Company. His wise counsel on any difficult personnel problem has been valued by all his colleagues.

Outside the Company he is also greatly respected by all those with whom he came in contact, especially Ministry of Labour officials and senior staff in employers' organisations and other companies. He received the CBE in 1960 for his contribution to labour relations in UK industry. He has been, on several occasions, a member



of an industrial Court or Arbitration Tribunal, and now, on retirement from the Company, the Ministry of Labour will not let him disappear from the scene completely and he has been pressed to take on the very onerous duty of Chairman of the National Dock Labour Board. His wisdom and friendship will be very much missed by us all, and our warmest good wishes go to him and his wife for a long and happy retirement.

Mr. E. J. Langford

Mr. E. J. Langford, General Manager—Overseas, retired from ICI after over 38 years' service on 31st December. Mr. M. J. S. Clapham, ICI Overseas Co-ordination Director, writes:

Edward Langford joined Brunner Mond & Co., as it was then, over 38 years ago—only a few months after the formation of ICI—having just graduated from Oxford with first class honours in Natural Science. He started in the Research Department at Winnington, and this was followed by a



spell as a junior manager on the Caustic Soda Plant. Most of his life with the Company, however, has been spent dealing with our overseas interests and exports; first looking after export sales in the Alkali Division, where after serving as Export Director he became Joint Managing Director and Chairman of the Magadi Soda Company; and later in Head Office, where he ended up as General Manager—Overseas.

Overseas affairs have never been easy—quite apart from the intrinsic difficulties of the problems themselves, there are often clashes of interests and conflicts of personalities. Edward was always able to reduce the problems to simple terms, and his tact, diplomacy and charm of manner enabled differences of opinion to be reconciled in a way which endeared him to our companies and associates overseas and, I venture to suggest, to our competitors and customers as well.

I should also refer to his impish sense of humour. Did he not once claim expenses for "fortune-telling," which immediately produced the intended reaction from the Accountants? I should hasten to add, however, that this was not to reimburse him for foretelling the future of ICI but for entertaining an important American delegation who insisted on using the services of a palmist-cum-crystal gazer provided by the hotel.

His many friends in all parts of the world will wish him a long and happy retirement.

Mr. B. W. Galvin Wright

Mr. B. W. Galvin Wright, ICI Publicity Controller, retired on 31st December after 38

years' service. Mr. M. J. S. Clapham, ICI Overseas Co-ordination Director, writes:

Galvin Wright entered industry from a school of art in 1918, and having retired from industry at the end of last year he is joining an enterprise to provide greater facilities for contemporary artists to show their work. As all his friends know, ICI's Publicity Controller is an artist at heart; a man with the rare gift of visual imagination, and with exacting standards of performance.

Perhaps it was this gift of the "seeing eye" which was spotted by Commander Ellis, head of what was then the ICI Advertising Department, when the two met in 1927—improbably enough, at a reception on board HMS Nelson in Portsmouth, where Galvin at the time was running Timothy White's advertising. At all events, later that year Galvin joined the Advertising Department, which subsequently was merged into Central Publicity Department.

It was there that I first met him in 1938, and learned that I had been taken on to run The Kynoch Press largely because of his insistence that its temporarily lapsed typographic standards be restored. He was the most critical ("Printing for printers again, I see") and the most creative of my clients. He put enormous effort into raising and



maintaining the standard of ICI's visual presentation, in every medium. One met in his office painters and photographers, printers and architects—I remember the young Basil Spence sitting on Galvin's desk expounding the design of an exhibition stand, and Anna Zinkeisen with one of her pictures for an ICI advertisement.

After a spell in Dyestuffs Division, where under Donald Scott's impetus he was struggling to raise the standards of British colour printing, he rejoined Central Publicity, of which he became Acting Controller in 1952 and Controller in 1954. Of his achievements there perhaps the most memorable was the series of advertisements *The things they say*: it was a notable feat, and one particularly suited to Galvin's character and talents, to present ICI not as an industrial mammoth but as an organisation within which lurked real humanity—and a sense of humour.

1980

The next 15 years in British industry

—some extracts from an address given by Michael Clapham to a conference convened jointly by the Confederation of British Industry and the Universities

My orders were to philosophise on life in 1980 as it appeared to an industrialist: but since this vision of the untravelled world was limited to thirty minutes, I must paint with a very broad brush and restrict my canvas. In particular, I must deal mainly with the United Kingdom, giving only the minimum necessary background of the world economy; and I must talk about productive industry, leaving later speakers to detail the pattern of what our consumption will be.

I start with one or two assumptions. First, that there will not be a world war: one cannot look forward at all on any other assumption. Secondly—and this could but will not here be justified—that in 1980 the national income, in real money terms, will be about 50% more than it is today, this extra spending power being divided about equally between the individual and the Government. Thirdly, that no revolutionary invention will have altered the economic basis of society—an invention, for example, which by 1980 has halved the cost of energy, or made any major industrial material or process totally

obsolete. This may seem a rash assumption, but I think the history of the application of ideas warrants it: the revolutions we see in the next fifteen years will arise from discoveries that have already been made. Finally, I assume the continuance of a mixed but mainly capitalist and competitive society: a society with wide freedom of individual choice, but some indicative planning: a state of things towards which the older communist societies may by then have moved some way.

Any man who picks up the trumpet of prophecy is liable to give forth an uncertain sound as he thinks of the fallibility of greater men who have trumpeted before him. In 1952 the Paley Commission, with all the resources of the United States Government behind it, foresaw that nuclear energy was “unlikely to make a contribution to electric generation during at least the next 10–15 years.” In 1875 Karl Marx wrote that “a general prohibition of child labour is incompatible with the existence of large-scale industry, and hence an empty, pious wish.” Pursuing this depressing concept into a

more recent and more imaginative work, it is chastening to re-read *Brave New World*. Aldous Huxley was writing in 1932; and his satire reflects what perhaps seemed to most of us the trend of an industrial society. “In Epsilons,” the Director of Hatcheries said, “we don’t need human intelligence.” The production-line civilisation, the world of Chaplin’s *Modern Times*, needed millions of semi-moron workers, with a few scores of “Alphas” able and educated to think.

The trend of development has in fact been utterly different from that despairing prophecy. Automatic plants and plant controls are rapidly replacing the helot factory worker as computers begin to replace the helot clerk; and the biggest anxiety of the industrialist who looks forward is not about the supply of hands or of materials but of educated brains. In 1932, when *Brave New World* was written, I.C.I. employed 30 graduates in each thousand employees of all sorts: today the figure is over 70. What will it be in 1980? My guess would be about double, say 150 in each thousand employees. The trend in other industries, which will tend

to become as science-based as the chemical industry, will be similar. Perhaps two-thirds, then, of all graduates working in industry in 1980 will leave university in the next 15 years. What sort of world should they be prepared to enter—and to lead?

The World in 1980

It is the industrialist’s function to foresee men’s material needs and desires and to provide the means of satisfying them. I ought therefore to look at the pattern of consumption before looking at the pattern of production. But since my subject today is the future of industry rather than its products, I must look briefly at the world economy in which our industry will be set.

One thing is certain, barring genocidal war, about the world in 1980: it will be vastly more populous than it is today. Even if a start has been made on dealing with the population explosion, we must assume that in 1980 there will be something like a thousand million more people on the face of the earth than there are now. This country, like the other countries of advanced industrial development, will have increased its numbers; but insignificantly compared with the less developed ones. Two-thirds of the world’s population will be in Asia. Hundreds of millions, mostly in Asia and Africa, will be living on the edge of starvation. At times some will go over the edge. In spite of the aid given by richer to poorer countries—and for the future peace of the world it should be much greater than it is now—the absolute gap in wealth between the more and the less developed countries will have increased. Faster population growth in the less-developed countries will reduce the benefit per head of their increasing production, while the more advanced countries, with their greater surplus for investment and their exploding technological resources, will have accelerated their rate of growth still further. The picture is gloomy but not desperate. Political problems between the richer and poorer nations will be frequent; but so will the intercourse between them. Our young graduate in industry may find that his career includes stretches of overseas work—helping to build a power station in Borneo, or start up a fertilizer plant in equatorial Africa, or supervise the programming of a computer in Kabul.

Secondly, I think it fairly certain that there will by 1980 have been some further aggregation of states. As a minimum I



Michael Clapham

would expect to see the United Kingdom belonging to an economic unit including most of Western Europe. To those who plan production and marketing it is already becoming essential to regard as one area the rough quadrilateral which lies between the North Cape and Cape Matapan, Cape St. Vincent and Cape Wrath. That will be the home market of the 1980 industrialist: he will meet his customers and visit his plants in Gothenburg and Syracuse, Berlin and Bilbao. He will meet continental competitors there, as well as in Birmingham and Glasgow. He will need fluency in at least one European language other than English.

Finally, in this brief look at the larger economy, there will have been an enormous increase in international trade. The more industrially advanced a country

is, the more it buys and sells its specialities overseas: it now seems likely that international trade will at least have doubled in 15 years. Men move round the world with their products. The industrial manager who travels 100,000 miles a year is not outstandingly rare now: in 1980 he will be packing the world’s aircraft.

Industry in 1980

As I shorten the focus of my crystal ball to look at industry in 1980, the picture gets fuzzier. If you handle long-term forecasts of production and capital you get to know one thing about them. However skilled and laborious the forecasters, they are always wrong—in detail. This is inevitable. The occurrence of invention is predictable; the incidence of invention, the applications of invention, are not. We

cannot be sure which of the processes and operations of industry will change in the next fifteen years or how they will change: we can be sure that drastic change will come. Think of the changes the last fifteen years have brought. Think of a 1950 gas works compared with a 1965 one. Think of the non-ferrous metal melter who in 1945 worked black and sweating over a pit furnace, heaving out red-hot crucibles of cupro-nickel; and who in 1960 was sitting white-coated in a swivel chair surrounded by instruments, watching on television the molten titanium swirling in a vacuum furnace. Think of the miner who 15 years ago worked on his side in the damp three-foot seam which is now worked by a remotely controlled cutter/loader. Fifteen years do not revolutionise industry, but for any man working in it they may change the physical environment beyond recognition.

I cannot therefore show a man his place of work in 1980 and say, it will be like this, or this. What I can do is to predict some of the ways in which the scene will be changed; and we will be changed also.

Some present trends will obviously continue. In the factory, the last fifteen years have seen the disappearance of thousands of simple repetitive operations needing more dexterity than intelligence. The "hot and heavy" jobs, needing more muscle than brain, will continue to dwindle. So will the jobs requiring attention and very limited responsibility. The long lines of girls on presswork or assembly; the heavy gang heaving two-hundredweight sacks; the patient figures watching instruments and waiting to turn valves or throw switches: all these are on their way to the industrial museum, along with the smoking chimneys and whirling belts of the satanic mill. Industry in 1980 won't need ox men or ant women.

In their place we shall have increasingly complex machines, more and more automatically controlled processes, with computers supplying all the intelligence that is needed in the jobs which used to be

sort of development will continue to replace the routine clerical worker. Already the number of clerks merely assembling statistics for the use of higher brains is beginning to reduce. By 1980 there *should* be some erosion of the higher grade office workers themselves, as it is realised that deducing the action required from the data presented can be performed by the computer which assembles the data. There will, however, still be fierce fighting in progress as managerial Luddites struggle to preserve the intervening paper.

With the disappearance of the counting house the ancient distinction between office and factory will dwindle. In both there will be need of men and women with skill and intelligence at levels below the graduate entry. Some will need skills to programme, others to maintain and trace faults in the electronic slaves; skills transcending those barriers of caste and craft in which our obsolete employment patterns tend to be fossilised. Indeed, the whole antiquated division between staff and manual workers should have disappeared at last.

We have no time to look at the detail of an industrial establishment of 1980, even if I had the vision to discern it. But what will be its main characteristics? First, it will use enormously more power. In 1980 industry will use about 2½ times as much electric power per head as at present. It follows that the capital required per man employed will also rise steeply.

Because of this capital intensification, and because of the economy that comes from a large scale of operations, the average size of the industrial unit will have increased considerably by 1980. When you look at the modern tools of industry—the automatically fed computer-controlled train of rolling mills, the big single-stream chemical plants, the transfer machines which take in a casting and turn out a machined cylinder block—you realise how immense the output must be to keep these untiring producers working continuously. Scale achieves economy; but scale means big capital requirements and big markets, *and* the organisation to sell in them. Our technical developments modify our economy—and tend to modify our economic geography.

There are other reasons why the scale of industrial enterprise will go up. The future belongs to the innovator; and the innovator these days has to deploy a

formidable team of men and women on research and development, with an increasing armament of costly instruments, buildings and experimental plants. To say this is not to decry the single-handed inventor, though perhaps he has long been a rarer figure than legend relates. The seminal idea may come from a man working alone or in a team; but major products generally demand a long period of refining and testing, process development and experimental plant design, which cost millions and may occupy a decade.

By 1980 this twilight period between invention and production may have shortened. A far-reaching change will result from people having instant access through computers to an enormous accumulated fund of knowledge: knowledge which is now parcelled out between scores of laboratories and libraries and thousands of files even in a single industrial organisation. Systems of data retrieval will be widely established by 1980, and they will cover the whole field of a company's activities, not merely its technical data.

In the wider field of data processing—the use and communication of knowledge—a practical example will illustrate the revolution which is taking place. In ICI the pressure on the internal lines of our computers communicating with each other has made it necessary to install a computer-controlled switching station to link the ninety establishments in our UK network. Including messages expressed in words—a diminishing proportion—this installation will next year start by handling a mere seven or eight million characters in 24 hours at speeds up to 2,000 characters a second: but this traffic will grow rapidly.

Indeed, the growth of our data transmission—or computer conversation—is running at about 100% per year, so that an extrapolation to 1980 would give you a figure as astronomical as it would be meaningless. Long before then, of course, the structure of this partial brain will be intercontinental: at present the research computers on Tees-side and in Melbourne have to communicate ponderously by cable.

These living libraries will not be confined to individual companies or to industry. I hope it will be possible to arrange limited access to information of common interest between companies—and no doubt unlimited access between

universities. Can we hope that there will even be some communication between the industrial and university systems?

There is not time to deal with all the new aids to the thinking equipment of industry. I would just mention one other which is available. You can have your internal telephones on a press-button calling system adapted to feed simple code messages to a computer. You can then pick up your telephone, tap out a code, and receive a spoken message from a computer giving you up-to-the minute data. By 1980 such systems should become as universal as the normal telephone in large-scale industry, and common even in small firms. The stock clerk will have his stores position literally at his fingertips; the managing director his control ratios. Given the instruction, the computer will telephone them when certain events occur within its purview. It will be easy to feed into it those figures of specialised concern which send men scurrying to ticker tapes: the change in Bank Rate or the price of copper, the balance of trade figures or the delays on the suburban services. Such facts will communicate themselves to those who should take action on them. Enlightened employers may save their staff's time by allowing the agency tape to include the Test score and the winner of the 2.30.

I have not mentioned these particular tools of management and research to impress anybody with the marvels of gadgetry. Nor do I mean to suggest that these electronic aids to handling information are the only devices which will affect the thinking parts of industry. But they are important because of their effect on our subject—the flow of men and ideas between the universities and industry.

The rest of Mr. Clapham's talk dealt with industry's requirements of graduates, the qualities that they would need, and the fields in which they would work. From this we have extracted part of the section on research and his concluding words.

Research

In this field there are, I think, some general trends discernible. For one thing, there will be a great deal more industrial research in 1980 than there is now. Expenditure on it is increasing faster than the growth in national income: in fifteen years' time there will probably be twice as many people as now working in this

field. What they will be working on I cannot foresee: but here are some guesses about their distribution.

In pure research—the pursuit of knowledge for its own sake—I would expect to see a small absolute increase but a decrease in relation to the whole. This is mainly because the range and the intensity of research directed at specific objectives is likely to increase disproportionately. In doing so it will absorb, and I hope satisfy, most of the available intake of people entering a research career.

The category of research with defined objectives includes process and product research, in which most effort is now concentrated. It will clearly still employ most people in 1980, though for reasons I shall come to I do not think it will grow proportionately to the whole. Nobody can guess what products and processes it will be concerned with, but one or two predictions about its methods can be made. There will be more mechanisation of routine experimental work. Computers will be used much more to locate fields of possible interest: to locate substances with specific properties, or conditions in which desired transformations may occur. They will be used more, too, to provide and assemble design data; to simulate processes; and to solve the complex, conditional problems of operational research. With further refinement of numerical analysis, computers will carry out so many sequential operations that the result will look increasingly like original thought. All this should add up to greater efficiency of research, and so to an acceleration of the rate of change.

All the more need, then, for a disproportionate increase, which I think will come, in a still neglected field of research. I can only describe it as humanity: the people for whom products are made or to whom services are rendered; the people who make and serve; the people who direct and manage. The categories overlap, of course, since we all come into two, and the manager who grows potatoes in his garden comes into three. And overlapping disciplines are called for: sociology, psychology and economics at least.

The basic problem is that technology introduces change more quickly than human beings accept its implications, however beneficial. The particular problems for research fall into two groups: those concerned with people as consumers and those with people as pro-

ducers. The problem of consumers is this: if you make a new product, however good, in small quantities, it will be expensive and unfamiliar. Only the rich will want it and buy it: therefore it will tend to remain a luxury for the rich. This vicious circle is at present broken by time; but our progress could be immeasurably faster if there were greater understanding of human desires and the means of influencing them.

It is not just a question of discovering what people want. People want what they know, and what they see similar people possessing. The problem is first to know what people *would* want if they could imagine it existing, or being within their means; secondly, by product and process research, to find the means to make it exist; and finally to persuade people to want it in such quantities that it can be made cheaply. The speed with which any society can change depends partly on creating demand and concentrating it on what is achievable. Industry will need more research in future into the techniques of doing so.

The second branch of research in humanity deals with people as producers. I think any manager in industry will agree that progress is as often held back by people's reluctance to accept it as by their inability to achieve it. Indeed, the whole rate of our economic growth depends less on any ineluctable laws than on generating the will to accelerate it; on changing people's attitude to change. Fears and resistances which were natural and justified yesterday are short-sighted and irrelevant today. We shall need more research to help management in its task of changing them.

Conclusion

In the course of these random predictions about 1980 I have tried to give an idea of the sort of men and women who should flow from the universities to industry—and flow back, to teach or study further. Some requirements at least stand out. Whatever section or function of industry they enter, they should be literate, numerate, and mundane; they should be prepared to start learning again at once, and to recognise that this education, formal or self-administered, will not end before their retirement; they should be intellectually enterprising, critical and constructive. For such people 1980 will continue to bring challenge and excitement. 23

Trouble at the Customs

WHEN some French friends visited our home last May they were amazed at the close-clipped neatness of our lawn and much taken with the motor mower which produces it. Immediately they were seized with the desire to take one home, for French-built lawn mowers, though roughly constructed and rudimentary by comparison (a grassbox is unheard of), are extremely expensive. Enquiries at a stockist produced the daunting information, however, that a £30 motor mower here would cost £60, once import duty and transportation had been added to the bill.

My wife (dear soul!) always eager to cut Gordian knots, red tape or anything else, was ready (all too ready, I thought) with the solution. We were going to France on holiday later in the summer. We would buy a mower and bring it with us in our car. I recollect wincing at the prospect. Ours is a small car; a 14-inch-bladed motor mower is no toy. But the promise had been given, the die cast. So on the eve of our holiday, before I packed our own luggage, I had to face the task of getting the mower in.

It was patently obvious from the start that it couldn't be stowed as it stood. It would just have to be taken to pieces. In due course I broke it down into seven parts, five of which I put into the boot, completely filling it; the other two on the floor behind the front seats. So on the appointed day we set off for Dover, crammed to the gunwales, expecting no particular bother from the French customs. After all, we had met the douaniers before, and what always happened? The kindly

peak-capped figure would beam upon us. "Rien à déclarer?" "No, only 200 cigarettes." "Eh bien. Bon voyage!" And then we'd be rolling along out of Calais and beyond, remembering to "Tenez à droite" and dreaming of the first stop for an apéritif.

But this time we had a motor mower with us, and it was hardly to be expected that no duty would be payable. As we disembarked and rolled into the French Customs hall, any thoughts of getting away with it, if we had even remotely entertained them, evaporated, for we discovered that the douaniers, generally so lighthearted and superficial in their investigations, were having a pretty thorough look at at least every second car in front. When it was our turn to be called forward, to the question "Rien à déclarer?" I replied in my indifferent French: "Yes. I have 200 cigarettes, but in addition to that a machine which one makes use of to cut the grass."

The douanier was clearly startled (he was already visualising, I think, something of the nature of a combine harvester). "Mon Dieu!" he cried, pushing his cap to the back of his head. "And where is this machine?" "I will show you," I replied, and, getting out, opened the boot and displayed the pieces to his official gaze. He gingerly felt the blades, then the roller, then the engine's fins. "Tiens!" he cried. "We must report this to the Chief Inspector. Follow me!"

As I followed him into the office I heard him say to the inspector, an elderly man, "There's an Anglais here with a tondeuse in his boot."

by Gordon Long

"Did you find it?" was the reply, "or did he declare it?" "He declared it," said the douanier. Thank goodness for that, I thought.

"Well, now, let's see," said the old inspector, "a tondeuse, motorisé, and new. That'll cost you duty of 50%."

"Oh, for goodness sake!" I cried. "Let's have some justice around here! This is not a tondeuse, but the *pieces* of a tondeuse I am importing!"

"Pieces mounted or dismounted, it doesn't matter a rabbit's hiccup," retorted the inspector. "It's 50%."

I tried another tack. "Come on!" I said. "I'm not a commerçant, come to France to sell this machine. It's a *present* for a friend—a dear French friend—with whom I shall stay and who would be affronted if I offered to recompense him with money. Ce n'est pas juste, ceci!"

By way of answer the inspector picked up a thick book of schedules he had been scrutinising and, turning it round, laid it before me on the counter. "See for yourself," he said. "Tondeuses are 50%."

"This is no good to me," I said. "My eyes are old and tired. I can't see without my glasses."

"My eyes are old and tired too," replied the inspector, but, taking off his specs and pushing them over my ears, added "Here, Monsieur, try these."

They served well, and I scrutinised the list. It seemed right enough, but, turning it round again on the counter and looking the old inspector straight in the eye, I said: "All right, friend.

But what's happened to the Entente Cordiale? This is a £15 tax on 'Fraternité,' not on a lawn mower!"

A softer look came into the old man's eyes. He removed the schedule, went back to his desk and began some rapid calculations which took some minutes to complete and which he eventually transcribed on to a form. Then he came back to the counter and laid the form in front of me with something of a flourish. "Et voilà," he said, "and is that any better?"

"I cannot tell," I replied; "you know I can't see." Again the old man smiled and, peeling off his specs, placed them over my ears. It certainly was an improvement. I couldn't understand all the details set down upon the form, but the addition came to 113 francs—£9. I looked up and beamed at him. "You have been very kind," I said, "and I will pay." "No, no!" he retorted, "it is you who are very kind, Monsieur. After all, were we not allies in two great wars?"

I paid over the money, shook hands and said "Au revoir," then walked across the customs shed, got into my car and drove off. Hardly had I cleared the exit when I heard shouts and cries behind, and looking over my shoulder saw three douaniers bearing down on us at top speed, with the old inspector not far behind. "My God!" I said to myself, "what can it be now?" I braked to a stop.

A breathless young douanier, leaning in through the window, whipped the old inspector's glasses off my head. Then we were off, amid laughter and smiles and cries of "Bon voyage!" Our holiday had begun.



the WINKING world

by Susan Wilsher

LAST April there took place in Rugby the third Congress of the English Tiddlywinks Association (ETwA). This Congress brought together winkers from all over the United Kingdom, the delegates representing clubs hitherto separated by hundreds of miles—Aberdeen and Aberystwyth, Exeter and Ely, all clubs being members of either ETwA or IFTwA (the International Federation of Tiddlywinks Associations). The meeting was held to discuss events and developments in the tiddlywinks world during the two years' interval since the 1963 Congress, to elect new officers, to amend, alter and improve the existing rules, and to discuss the international situation (winkwise).

For the average layman, or non-winker, to have such phrases as "squidging off," "potting out," "double squopping," "pot squop," etc., flying haphazardly around his ears is a peculiar, not to say terrifying experience. Towards the end of this Congress, however, his ears would have become more accustomed to this strange language and he might even indulge in a short game of "pot squop" himself. "Pot squop" is, in fact, the term applied to the set of tactics employed by the vast majority of winkers (excluding the top international players, who use a highly complicated type of game known as "double squop") who have had some experience of the game.

26 The game is played between two pairs,

each player having six winks and a squidger (a circular disc, 1-2 in. in diameter) with which he flips or "squidges" his own, and only his own, winks, and it is played on a standard international mat 6 ft. x 3 ft. with the pot placed in the centre. When a wink is covered, by however small an area, by another wink of whatever colour, the covered wink has been "squopped" and cannot be played. Pairs will divide themselves into what are known as "potters" and "squoppers," the aim of the potter being to get all his winks into the pot as quickly as possible and to avoid getting squopped by his opponents; the squopper spends his time in squopping his opponent's winks and thus preventing them from potting, and also he protects his partners' winks, freeing them if they do get squopped by an opponent. This the squopper achieves by squidging his wink on to the top of any winks that are covering his partner's wink (or winks) and then desquops by playing his top wink very firmly so that, in fact, the whole pile is dislodged and (he hopes) his partner is freed. Actually it is very difficult to avoid playing a foul shot at this sort of stage, i.e. playing winks other than your own top wink, but winkers are a very gentlemanly lot and understand about these things, knowing full well that they are going to play a similar shot on their next turn!

Of course, it is not always as simple (!)

as this, because before the squopper has a chance to free his partner he himself may be covered by an opponent and must therefore place another of his winks on top of the pile again and so on. Thus a pile may build up of as many as thirteen or fourteen winks, each wink covering a small portion of the wink below and the pile therefore extending a great distance.

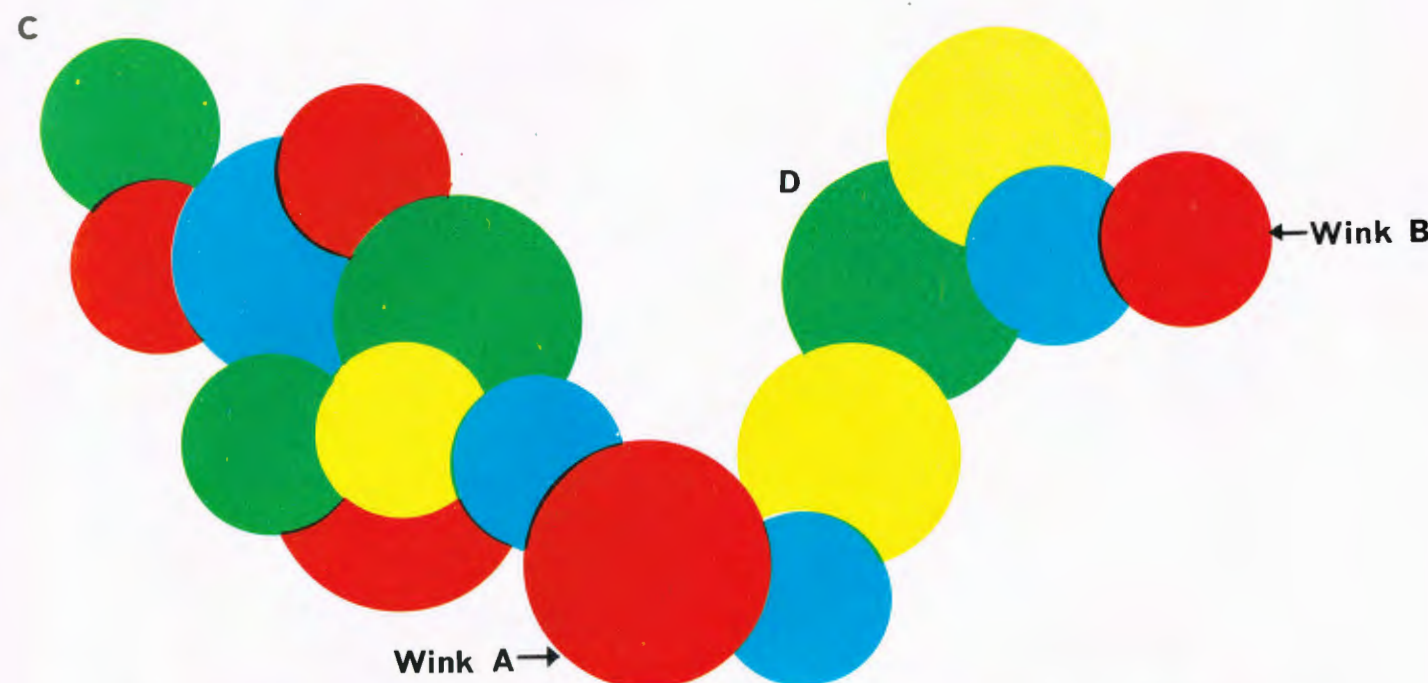
The first afternoon of the Congress was concerned with the general running of ETwA and its publications, and a pooling of ideas from all clubs on such matters as subscriptions, membership, upkeep of pitches, care of winks, etc. The official ETwA publication is *The Winking World*, and this is issued twice a year in March and October, price 6d., and contains much information as to international results, Silver Wink Trophy winners, comments on matches and even a problem page, where winkers can write on any problem of procedure or interpretation of the rules.

The Silver Wink Trophy is a trophy presented by Prince Philip, a strong supporter of tiddlywinks, to be competed for by universities in the United Kingdom and which is held at present by Oxford University. There are other trophies in the tiddlywinks world such as the Bombay Bowl and the Marchant Trophy, both coveted awards. The Silver Wink competition is organised each year by the holders, and it is currently the turn of the men of Oxford to try to arrange matters so that Exeter and Aberdeen do not meet each other in the first round—a distance of 556 miles being no small problem to penniless winkers, however enthusiastic.

At the end of this session, questions on rules and interpretations of rules were invited so that everyone had a chance to think about these during the evening while playing, to be prepared for the morning session when these queries would be debated and answered. (It was at this stage that the BBC man who had hitherto stifled his mirth was overcome and had to hurry from the room!)

The Congress then broke for dinner, and it was pleasant indeed to be able to carry on an intelligent conversation on tiddlywinks without having one's fellow diner dissolve into fits of uncontrollable laughter at the mere mention of the word "squidger." After dinner the long tables were prepared for the more serious business of the day—winking began. Many were the old partnerships renewed

GREEN AND BLUE ARE PARTNERS
YELLOW AND RED ARE PARTNERS



There is no scoring difference between large and small winks

This pile was originally two piles—started by winks C and D. Wink A has braced the two piles

and old and new foes vanquished, and as this Congress consisted chiefly of the top thirty players in the country, the game of pot squop was almost non-existent and double squop was the form employed on the tables.

This is a highly complicated set of tactics whereby all four players are squopping and games nearly always go to the time limit of 25 minutes, after which five extra rounds are played, and unless during this time a player "pots out" there is a strong likelihood that there will be no winks at all in the pot by the end! This rather negative game has led to a great deal of criticism and a call for brighter tiddlywinks, but this is more from the spectator's viewpoint, as the game calls for a very high degree of skill and is absorbing and rather nerve-shattering for the actual players.

The next morning, after having to clear away four stalwart winkers who had either made an early start or had stayed up all night, the Congress resumed at 10 a.m. The first item was the election

of the officers, including the re-election of Mr. Harry Secombe as Honorary President, and then we got down to the real business of the day: the rules.

The first question considered was the size and material of squidgers: people had come across opponents using metal and bone squidgers which, they said, caused considerable damage to the winks, not to mention the possibility of injury to players when squidgers were hurled across the room in disgust—also during wink duels to settle personal scores, when metal squidgers at fifteen paces could inflict severe wounds! This point was dealt with by the ruling that all squidgers should be made of plastic of some form.

Point two was the question of winks being squidged off the mat—where should they be replaced and at what distance, and what was the ruling if two winks were squidged off by the same shot.

In any meeting of winkers one always gets caught up in the argument of tables v. floor as playing surfaces: sure enough, it cropped up again here. The Cambridge

delegates were very much in favour of floors—probably because they have no suitable tables—but the feeling of the Congress was against them and the chairman ruled that it should depend on what the home team could supply. If they had tables of the right size, then the opposition should agree to use them; but if they had no tables or the tables were too small so that some amount of playing area was lost, then the visiting captain retains the right to elect to play on mats resting on the floor.

After lunch, the question of procedure after the playing of an accidental foul shot was discussed.

Other minor points of law were debated and the various record attempts for speed and accuracy commented on. After this a short film was taken by the BBC of a match in progress, and then the Congress ended with the enthusiastic singing of the Tiddlywinks Anthem, the words written by the late Rev. E. A. Willis and the tune an abridged version of "Men of Harlech."

NOW OR NEVER—the photographs

By John Sisson

I have always enjoyed “seeing things,” and as I have a good visual memory I often recall with pleasure my first sight of a real vineyard, of gnarled olive trees against the red soil of Provence, of the castles and caves of the Dordogne, of the Alps from the air, of Vesuvius, of the Acropolis and Delphi and of the islands of Greece, and of many other wonders, natural or man-made, scattered about over Europe.

One of the by-products of business travel is the opportunity of looking, if only for a moment, at things outside Europe. Sometimes from the air you see something you will never forget—the bright blue-green circle of a coral island, great waves of sand in the Arabian desert, the “ox-bows” of the Mississippi like an illustration from a geography book, lightning flashing over the mountains of Greenland, or the strange-coloured lands around Lake Titicaca. Down to earth, another set of pictures—a village temple in

Mysore, the great view of Everest and Kanchenjunga from the Sandakphu ridge above Darjeeling, Table Mountain and the Cape of Good Hope, the country markets in Mexico, and much else—but it is no good writing a catalogue.

When on journeys of this kind, I always try to take a photograph of anything that interests me, but it is surprising how difficult that is. Good photographs need leisure to decide exactly how best to take them, and sufficient time for this is rarely available even when on holiday. On business trips, with the hours and days scheduled, photographs must be taken on the spur of the moment, and, particularly where landscapes are concerned, the sun never seems to be where you want it, or it is raining, or the car does not stop at the best point for the view and you cannot delay the journey while you clamber up some rocks two hundred yards back along the road so that both a mountain and a cactus in bloom will appear in the picture. Indeed, I often

one can never take again



The Cruz del Paramillo, 10,000 feet above sea level in the Andes

feel the patience of my host evaporating, so that sometimes I do not ask him to stop the car at all and I then must rely on memory. Back at home, looking at a few good pictures among a lot of rather dull snapshots, I can only say, “Well, I shall never go there again, but the surprising thing is that I was ever there at all!” and rely on my memory to fill in the details of the trip.

In October I went to Brazil, Argentina, Chile and Peru for three weeks, and each weekend my hosts arranged for me to see something of special interest. The five photographs reproduced here will give some idea of what we saw.

The first weekend I was due to fly



28 The falls of Iguassu, near to where the frontiers of Argentina, Brazil and Paraguay meet



Machu Picchu—the lost city of the Incas



The great sundial at Machu Picchu—"the hitching post of the Sun"

from São Paulo in Brazil to Buenos Aires in Argentina. There is a perfectly good direct plane, but I had looked at the map and seen that a small diversion would take me to the Falls of Iguassu. I had long wanted to see these falls, not only because of their size but also because they are in the remote spot where the frontiers of Argentina, Brazil and Paraguay meet. A Brazilian plane flies to the Falls from São Paulo, and it seemed a simple thing to cross the Iguassu River to catch the Argentine plane.

The five-hour flight to Iguassu was in a DC3, which stopped at dirt-strips on the way and bumped over the hills between them. The unpleasant journey was soon forgotten at the sight of the Falls, higher than Niagara and twice the width and volume, but so much more impressive because of the setting of tropical forest. Although it was humid and the temperature over 100°F, we scrambled about trying to find the best view to photograph, but it was impossible to take more than half the Falls in any one shot.

After a night at the hotel, we crossed the river by ferry to view the Falls from the Argentine side. The weather looked ominous, and it was too dark for colour photography.

30 Soon we were in a tropical rainstorm, and the roaring Falls

were forgotten in our rush for shelter. Worse was to follow—the airstrip was reduced to mud, the plane cancelled and no hope for another one till midweek. We had a miserable retreat across the Iguassu River, trying to keep ourselves dry in the ferry boat under borrowed umbrellas. It was a long way round to Buenos Aires, for we had to motor across Paraguay by night to catch a plane from Asunción, but we arrived only a few hours late. I had seen Iguassu!

The next weekend I was in Mendoza, in Argentina, to visit Duperial's plant there, and a day trip to the mountains was arranged. About forty miles from the city we reached the summit of a pass in the foothills of the Andes. Here, ten thousand feet above sea level, was a little shrine and cross, the Cruz del Paramillo, and a view of the main chain of the high Andes some thirty miles away across a wide valley. The splendid snow-capped mountains were brilliant in the morning sunshine, and somewhere among them was Aconcagua, the highest mountain in the Western Hemisphere.

We left the pass and crossed the wide upland valley, which was desert scrub except where watered by streams or irrigation canals. Sometimes a line of bright green poplars



A distant view towards Chile across the Andes

lined the road framing a view of a distant snow-capped peak, and there were striking contrasts between the harsh red and yellow foothills without any vegetation and the fertility of the upland meadows. We went some little way up the road which leads over a high pass in the Andes to Chile, and here I took the picture which shows well the arid scrubland, the green woodlands near a stream, and the snow-capped peaks. It was a splendid day for mountain views, and I shall long remember it.

The last weekend was in Peru, and it was spent in a visit to Machu Picchu, the "lost city of the Incas." The journey there inflicts a proper humility on the pilgrim. First, the three-hour flight from Lima to Cuzco in an unpressurised DC4. The plane cruises bumpily at 20,000 ft or so, and you suck at an oxygen tube while gazing at the Andes below and beside you. Then you must acclimatise yourself to the altitude of Cuzco (11,400 ft), and take a five-hour rail journey, before you reach the ruins.

The city stands on a ridge some two thousand feet above the Urubamba River. All around are the kind of sharp pointed mountains you see in Chinese paintings, with clouds swirling round them. It was a poor day, with little

sun, but I consoled myself with the thought that, even if the sun had shone brilliantly, a good photograph of the classic view would not have been possible, for early morning or evening light is necessary to bring out the contrasts. We only had a few hours in the early afternoon, so I tried to take pictures which would, in spite of the flat light, catch something of the mystery of the place.

One of the views reproduced here shows how the city hangs over the edge of the steep hillside, and how impregnable it was, for the other side of the ridge is just as steep. The other shows the great sundial, romantically called "the hitching post of the sun," which stands at the highest point of the city: behind it is the nearby peak of Huaynapicchu, itself topped by more ruins, and the clouds which hide more mountain peaks. After that splendid sight, the journey back to Lima was an anticlimax, and it was not long before I was on the plane for London.

I had added some prize specimens to my collection of interesting places, thanks to the heads of ICI's companies in Brazil, in Argentina, and in Peru. They not only made the arrangements, but gave up their spare time to take me on these weekend journeys.

DOWN THE WORLD'S DEEPEST CAVE

by John Woolley

DOWN the world's deepest cave, wherein are giant stalagmites towering 50 ft or more high, vast underground galleries with floors strewn with boulders as big as houses and through which a river runs in perpetual darkness—these were some of the things in store for me when I was asked to accompany the British Expedition to the Gouffre Berger of 1964. The Berger is a great pothole running through the heart of a mountain near Grenoble in France, named after a young Frenchman, Jo Berger, who first discovered the entrance in 1953. It became the world's deepest explored cave when an international team under French leadership in 1956 reached a point 3,681 ft below the surface, and here further progress was barred by the cave passage dipping below water level. Despite many attempts, this point, called the terminal siphon, has since been reached on only three occasions, each time by British teams.

In August three teams set out from this country to the Berger, combining to form the 1964 British Expedition. Each team had a different objective in the cave. One team aimed to reach and dive through the terminal siphon and thus penetrate deeper into the cave. The second team was to explore an upper gallery which had been seen by previous expeditions high in the roof of one of the big underground chambers. The aim of the third team was photographic: to record, on 16 mm cine and black and white and colour stills, the descent of the cave and its very fine geological formations. I was asked to take charge of the still photography, and two members of ICI Dyestuffs Division, Ian Smith and John Wilson, were also in this team.

This was, of course, a large expedition involving more than 50 men, with 22 in the photographic team, and months of planning were required, as well as much hard work, in assembling equipment, food, photographic gear, transport, etc. It requires 2000 ft of wire ladder and more than twice this amount of rope for belays, lifelines and lowering gear down



Progress through the Winding Cleft by "backing and footing"

the big vertical pitches to reach the bottom of the Berger; rubber dinghies to cross the underground lakes and streams; tents and sleeping equipment for the underground camps, and food and personal gear for the underground parties. Our main problem was providing the powerful lights required for the cine filming and their power supplies. Many were the schemes considered and rejected before an adequate set-up was achieved. Even then we were appalled at the weight involved—nearly a ton in all, which

worked out to a hundredweight per man—and the prospect of transporting it down a cave of the severity of the Berger.

The technical problems of the descent of the Berger are many and varied. The cave can be divided conveniently into four sections. First there is the entrance series of pits and shafts, with the notorious Winding Cleft and big vertical pitches. Then comes the River Gallery, followed by a wet section, a series of cascades, down to 2800 ft.

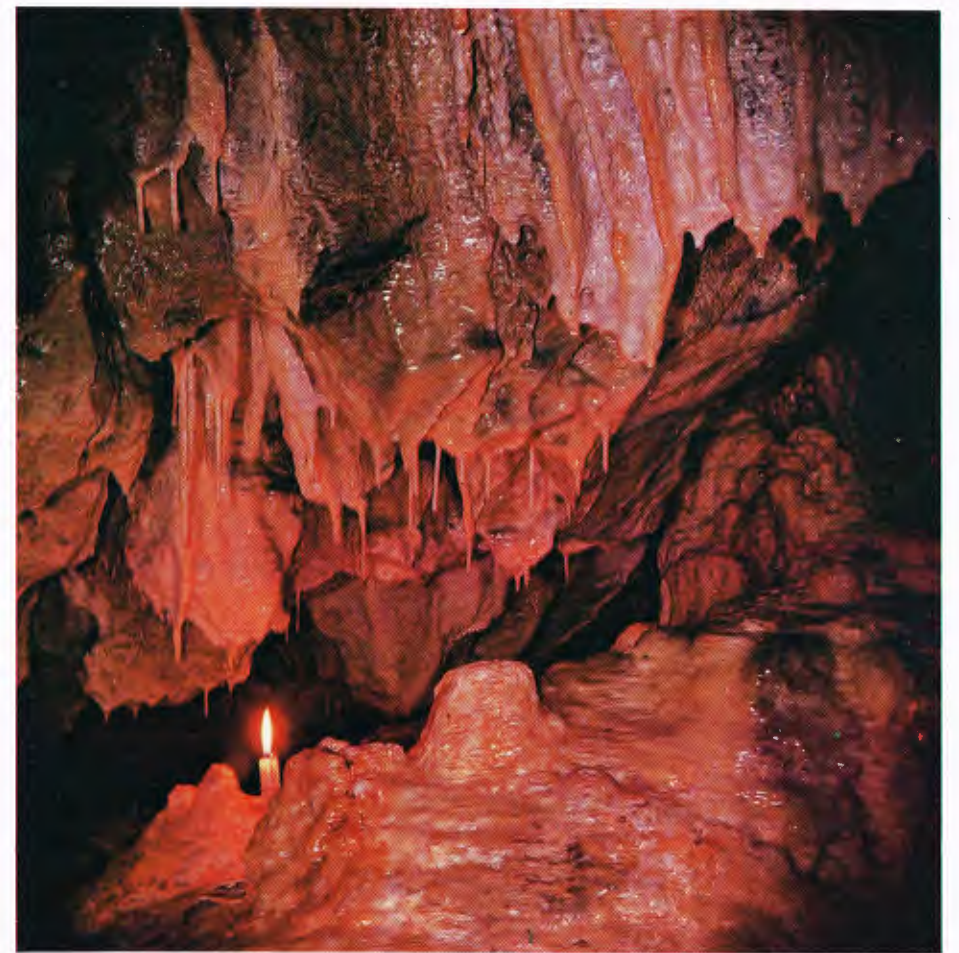
The final section is severe caving by any

standards. One moves with the water down a further series of great pitches, with the terrifying prospect of 180 ft of ladder hanging through a waterfall, down which one would have to transport the heavy cine equipment, followed by canals 100 ft deep or more over which personnel and gear would have to be shipped on rubber dinghies. It is cold in the Berger, with an average temperature of only two degrees above freezing, and the problem of exposure under the above conditions is considerable.

On our very first day down the cave I had climbed down below the filming group, in order to take some still photographs, and was standing on the edge of the 100 ft deep pit of Cairn Hall, lost in amazement and wonder at the sights around me. More than eight hours had passed since we had entered the cave and we did not know that a violent thunderstorm was raging up above. Suddenly there came the dreaded shout of "Below!" the caver's warning that something unpleasant was on its way down. I dived for shelter under a rock ledge. With a roar, a deluge of water came rushing down the cave passage and over the spot where I had been standing a moment before. Cracks and crevices in the roof began to add their quota of waterfalls, large and small, and it was obviously time to get out of the cave as quickly as possible. Grabbing my camera box, later found half full of water from the spray flying around, I joined the others at the foot of the entrance shaft and we left the cave. Outside the sun was shining, but all around were ominous black clouds which boded ill for further work below.

Six inches of rain fell during the next twelve hours, filling the lower reaches of the cave with raging torrents. The group working on the problem of penetrating deeper down the cave were trapped by rising waters. It was twenty-four hours before they reached the safety of one of the underground camps. Because of the flooding of the lower galleries any further attempts to establish a new cave depth record had to be given up.

Despite the wet state of the cave, the filming group decided to carry on with a curtailed programme. Three days later saw us again assembled in Cairn Hall ready to enter the Winding Cleft. When characteristic features of a previously unexplored cave are encountered, such as shafts, halls, lakes, etc., it is customary to



Stalactites and stalagmites illuminated by candlelight



Crossing Lake Cadoux on an inflatable dinghy

bestow names on these to help describe the cave and equipment required, for the benefit of subsequent explorers. The names may be descriptive (Winding Cleft, River Gallery, Great Rubble Heap), or after members of the exploring team (Garby's Shaft, Lake Cadoux). The

Hall of the Thirteen was so called because thirteen people camped there during first explorations of the Berger, and this was also the number of stalagmites in the greater cluster which dominates this Hall. The Cleft is an enormous crack varying in width from one to three feet and extending



Hall of the Thirteen: 1600 ft below the surface with the gour pools and a background of stalagmites

upwards and downwards for hundreds of feet. Progress was made through the Cleft by "backing and footing," that is the back is pressed against one wall-with the feet against the other wall, and first the back is moved an inch or two forward and then the feet. This is a slow and strenuous mode of progress, with only friction to hold you up. The method is even less attractive when you have a 70 lb battery pack swinging between your legs from a rope attached to your waist and a 150 ft drop below you. The Cleft seemed interminable with the to-and-fro shunting necessary to convey the heavy filming equipment through, although it was only 300 yards in extent. It was certainly a most dangerous part of the cave, and all were relieved when at last all men and tackle were safely through.

A series of great shafts up to 150 ft deep followed the Cleft. Typical was Garby's Shaft, a clean dry vertical tunnel of classical pothole shape, about 30 ft in diameter and 140 ft deep. After the confines of the Cleft it appeared a tremendous drop to the bottom, the carbide lamps of the men who had already descended seemed small and twinkling with the distance, and their voices were faint and hollow as they echoed up the shaft. Once on the ladder it proved to be the most

enjoyable pitch in the cave. I stopped half-way down for a rest, snapping the carabiner of my shoulder sling on to a rung of the ladder so that I was safely anchored, and stayed awhile thoroughly enjoying the strangeness of my situation. The ladder hung clear of the walls, vanishing in perspective above and below me to a thin aluminium line. I felt like a spider descending a deep well on its thin solitary thread.

At 800 ft below the surface the shafts led into the River Gallery. On emerging from a small hole it seemed almost as though one had left the cave and come out into a dark night, for the beam of my carbide lamp vanished into blackness. I instinctively looked up, expecting to see stars. It was a huge cave, with the roof in places nearly 300 ft high. Down the middle ran the river which, thousands of years before man appeared on the earth to explore them, was carving these passages out of the living rock. Progress down this part of the cave was easy, and we soon reached Lake Cadoux. This forms a formidable barrier when much water is in the cave, and inflatable dinghies then have to be used to cross it.

Shortly after crossing Lake Cadoux we came to another of the splendid sights which the cave kept on presenting. So far

we had not seen any stalagmites or stalactites, and when we saw a large orange dome ahead, about 5 ft tall and 3 ft wide, we rushed forward to examine it. A trickle of water from the height of the roof fell into a cup-shaped depression on its top with a musical splashing, throwing up an array of droplets which scintillated and sparkled in the powerful photographic lights. As the cameras were being set to film this I suddenly had the feeling of being watched by unseen eyes. Swinging one of the spotlight beams along the cave revealed an astonishing sight. The whole of the slope ahead was covered with giant stalagmites, some thirty or more feet tall and coloured dark in hue by mineral contamination. The impression they gave was that of an army of hooded figures with arms akimbo, silently watching and guarding their realm. Much time and film were spent in this, the Bourgin Hall, before moving on. The scene was appropriately ended by a curtain of pure white stalactites, hanging from the roof like a row of crystal swords.

In the next section of the cave, known as the Great Rubble Heap, the roof vaulted up out of sight, the walls separated until they could not be seen, and the whole floor was buried beneath a chaotic heap of boulders, large and small, which

had fallen from the roof and walls. Progress through this maze was slow, as many of the boulders were as big as houses. The width of the cave was tremendous; once we determined the time a man required to traverse from one wall to the other, and this was twenty minutes. To find the way through was a problem in route-finding, for it was easy to get lost, therefore the best route was marked by an aluminium tape so that time and effort would not be wasted. It was not very reassuring to find one day that this tape was covered in one place by a massive boulder, weighing several tons, which had crashed down from the roof during our stay in the cave. We heard several such roof falls during our six-day sojourn below, indicating that here the cave was still very active in its process of formation.

The Great Rubble Heap flattened out into a plateau on which was sited one of our underground camps and below this was the beautiful Hall of the Thirteen, the showpiece of the Berger, 1600 ft below the surface.

Here the floor was a patchwork of crystal-clear pools, each separated from its neighbour by a sinuous reef of sparkling calcite, deposited through the ages by slow evaporation on the rim of the pool. These rim-stone pools are found in other caves but are usually small in size, being up to 3 ft across. These we now saw were giants, 50 ft or more across and as deep. On shining a light into a pool, so clear was the water that the bottom was easily seen, and this sloped up to the shore in coral-like aggregations of limestone crystals which sparkled in the light like a casket of diamonds. The roof towered high above, and the walls of the Hall were covered with many varieties of calcite encrustations. The whole scene was dominated by a group of enormous stalagmites at the far end. The impression was one of a great cathedral of unearthly beauty.

The Hall of the Thirteen was as far as we reached with our cine filming, having now run out of both time and film, and so we packed up the photographic gear and prepared to leave the cave. It was with mixed feelings that I left. Strongest perhaps was a feeling of relief at returning to sunshine and a good wash after six days below ground. There was regret that we were leaving unsolved the mystery of where and what lay beyond the siphon at 3681 ft down.



Developing gour pools with water streaming off a stalactite



Calcite formations and their reflections in a gour pool in the Hall of the Thirteen

WINTER MORNING *by J. M. Wilson (Agricultural Division)*

